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Corporate Executives' Guide To Communications

COMPUTER DECISIONS®

NOVEMBER 15, 1984

BUILDING A CORPORATE COMMUNICATIONS SYSTEM

SPECIAL ISSUE

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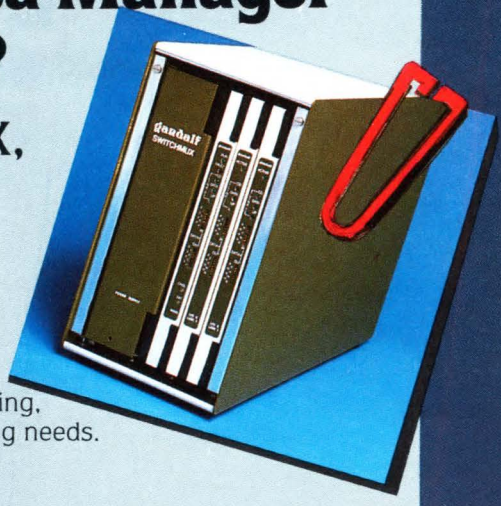

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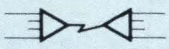

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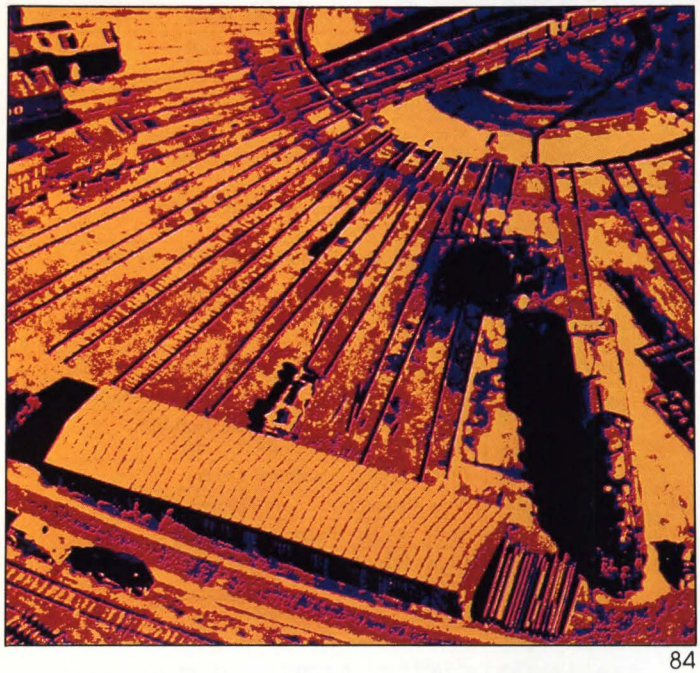

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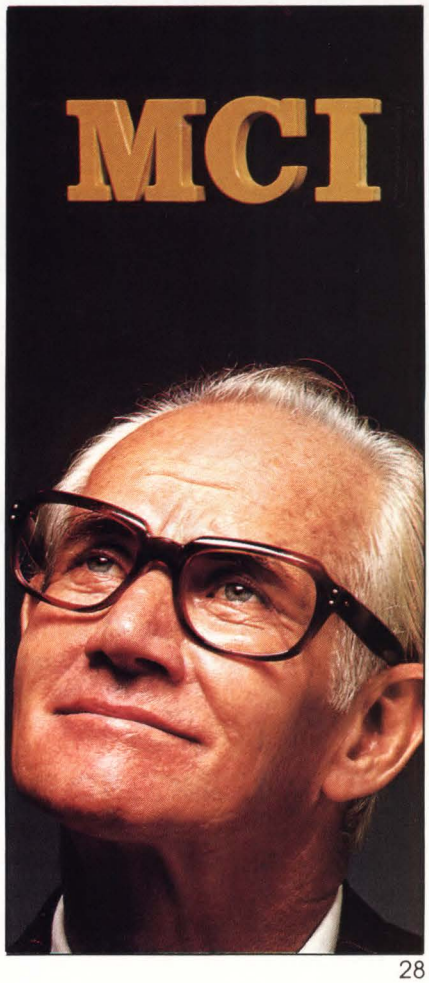

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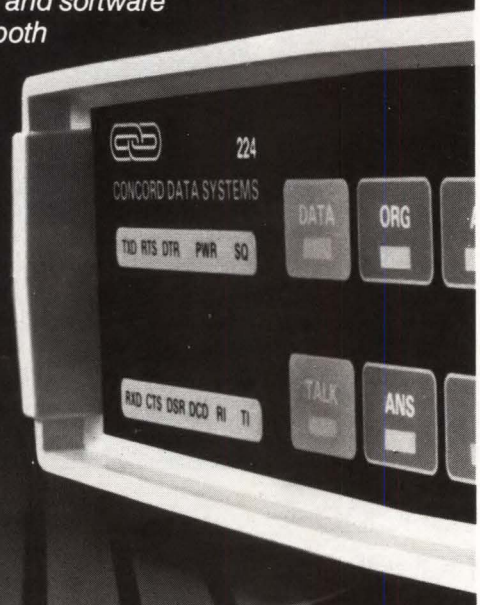

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CIRCLE 2

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Headquarters Office
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Managing Editor: **John Rymer**

Senior Editor: **David Whieldon**

Software Editor: **David J. Kull**

Assignments Editor: **Joseph Hillhouse**

Art Director: **Bonnie Meyer**

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Western Editor: **Martin Lasden** (408) 736-6667

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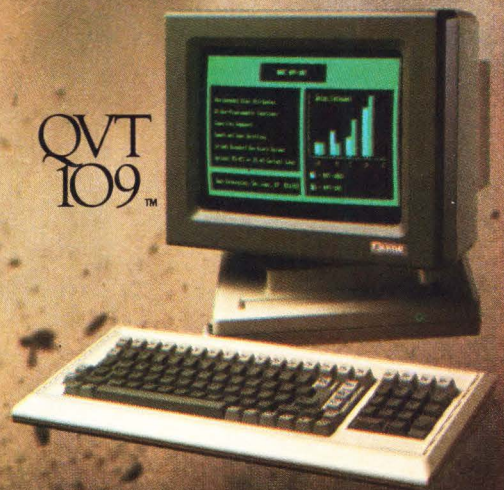

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CIRCLE 3

THE MOST IMPORTANT FEATURE YOU'LL FIND IN DIGITAL'S TELEPRINTERS IS THE COMMITMENT BEHIND THEM.

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Each new model introduced since the LA36 teleprinter has been yet another demonstration of our commitment to the needs of the marketplace. And an equally strong demonstration of the market's commitment to us. For the popularity of our products, in several cases, has actually helped drive the industry to adopt new standards. With the introduction of the LA36 teleprinter, for instance, came the wide acceptance of the 300 baud communications rate. And the LA120™ teleprinter helped popularize the faster 1200 baud rate.

Digital's commitment to the teleprinter market remains rock-solid. Our terminals manufacturing plant in Arizona currently produces more teleprinters than ever before. So as long as there's a need for teleprinters, you can count on Digital to fulfill that need. With a product specifically designed for the job.

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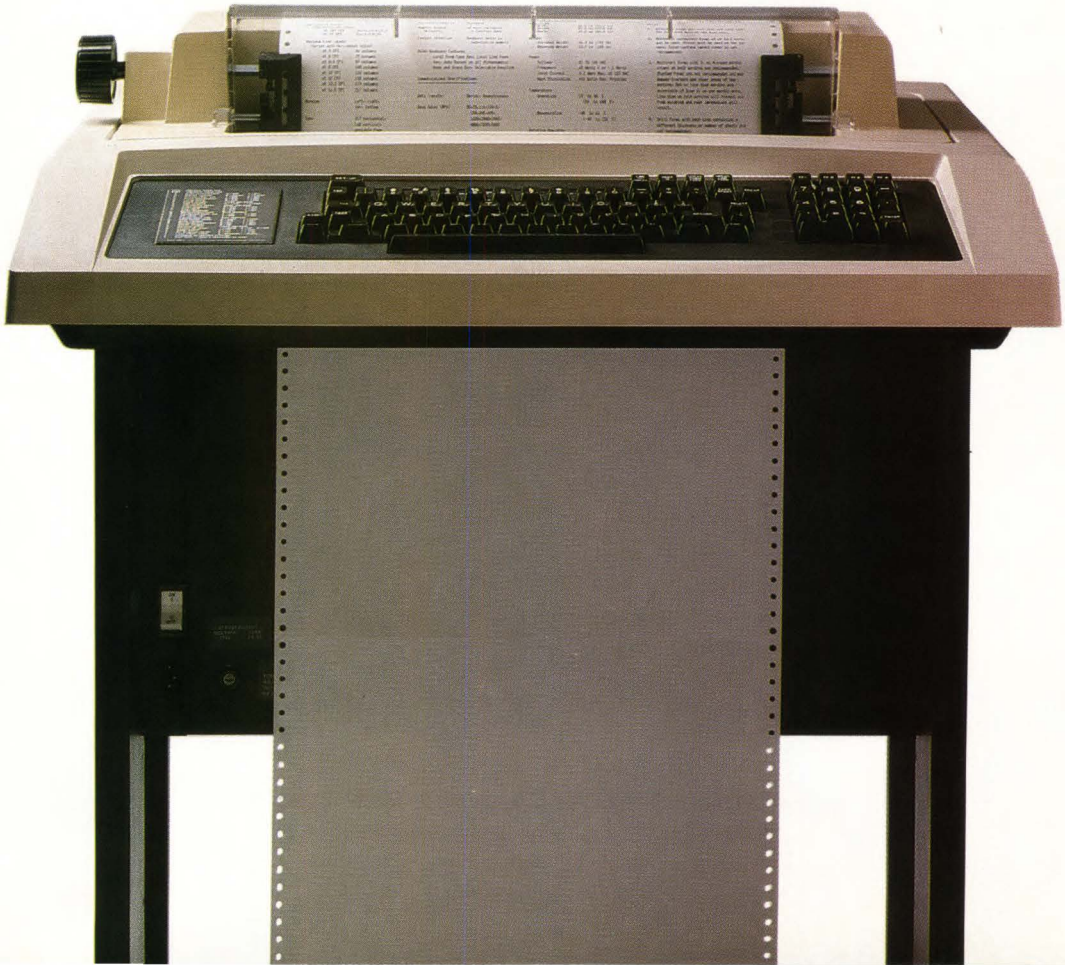
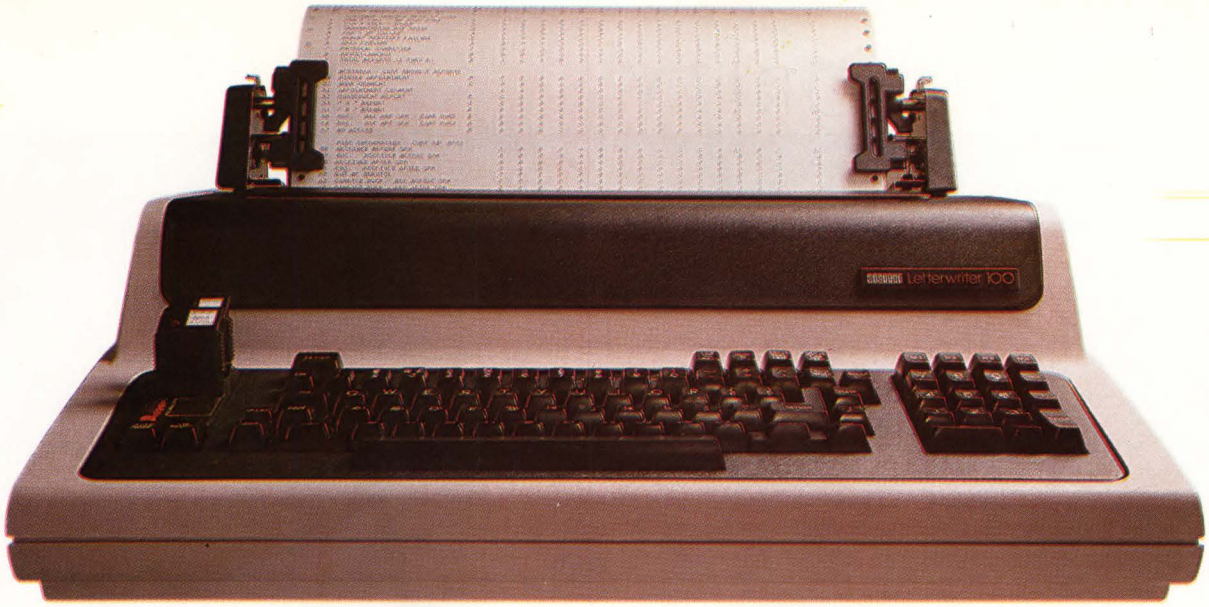
It gives you exactly what you want. Fast draft speed printing at 180 characters per second. Fanfold paper capabilities in widths up to 15". A choice of 8 character widths. And extensive communications support, including auto answerback and auto disconnect.

Most importantly, the DECwriter III teleprinter is a true master of forms. Some 45 features, like horizontal pitch, left/right and top/bottom margins, as well as horizontal and vertical tabs, are all summarized right on the keyboard, allowing you to set up formats in an unusually quick and simple manner. Then, once set, all can be stored in non-volatile memory. And the DECwriter III teleprinter can provide crisp, legible forms up to an impressive 6 parts.

DIGITAL'S LETTERWRITER 100. THE BEST ENGINEERED TELEPRINTER FOR THE OFFICE.

Flexibility is the word that best describes the Letterwriter 100™ teleprinter. For starters, you have a choice of multiple print speeds. You can print a draft copy of a one page proposal in just 10 seconds. Then,





by simply pressing a single button, you can shift from a high speed 240 characters per second to a high quality 30 characters per second, with printing that's difficult to distinguish from true letter quality. There's even an optional 80 character per second memo mode that's ideal for interoffice correspondence.

For further versatility, the Letterwriter 100 teleprinter lets you select from 8 different character widths, multiple character sets and a wide variety of typefaces. In fact, you can store 5 different typefaces resident within the teleprinter, and the selection can include Courier 10, 12, and Italics, Gothic 10 and 12, Orator 10, and APL, so you can select the style that suits the job as easily as pressing a key. And, in the event you'd like to illustrate a particular point, bit map graphics help you do just that.

The Letterwriter 100 can handle the paper that best suits your needs. Sheet, fanfold or roll, in any width up to 15".

Finally, the Letterwriter 100 product tackles all your forms. Setup is simple, and the high quality dot matrix printhead provides crisp, legible copies through 4 part forms.

In short, the Letterwriter 100 is the one teleprinter that finally lives up to the requirements of your whole office.

THE DECWRITER CORRESPONDENT. THE ONLY FULL-FEATURED COMPACT YOU'LL FIND.

In many situations, the applications themselves suggest a clear solution.

But just as often, the solution isn't quite so clear.

That's when you need Digital's Correspondent™ teleprinter. It's the closest thing to an ideal, all-around terminal.

Consider its wealth of features. The Correspondent teleprinter allows you to use ordinary single sheet, roll, or fanfold paper for high quality output that won't fade over time like thermal paper. It also gives you the flexibility to print multiple part forms and labels. And you may customize the text output to your own particular style by selecting from a wide variety of character sets, widths and sizes alone or in conjunction with bit map graphics.

But what makes the Correspondent teleprinter truly impressive is that you get all these features in a compact little 20-pound package. A package complete with three communications interfaces. Not just the usual RS232-C port, but a 300 baud acoustic coupler and a 300/1200 baud modem as well. That means the Correspondent teleprinter can function as a console or as a transportable terminal that can move from desk to desk or office to office, ready to communicate in whatever mode is available.

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CIRCLE 4

A TOP PRIORITY

Photo by Ted Hardin

TAKE CHARGE OF COMMUNICATIONS

With old Ma Bell out of the picture and technology racing ahead, managers have got to master unfamiliar, even hostile, territory.

by Sally E. Ketchum

Pity the poor, beleaguered telecommunications manager. Thrust out of a relatively uncomplicated and anonymous existence by the breakup of AT&T, this professional is now being bombarded by directives to make communications faster, better, cheaper—all this wizardry expected from managers whose biggest problem a few months ago was connecting with the right AT&T representative.

Well, times have changed, and technological developments, in tandem with the breakup of the communications giant, have put the telecommunications manager on the hot seat. With the advent of the information age and the trend toward decentralization, corporations are viewing telecommunications in a new light. As one *Wall Street Journal* article put it a few days before the breakup: "The telecommunications networks of the information age are the railroads and highways of the industrial age." A company's communications, the author added, should be considered a major asset, which must be managed to keep costs low and efficiency high.

What, then, is the next move for telecommunications managers, cut off as they are from the security of Ma Bell's apron? No longer supported by AT&T's complete line of services, these orphan managers must shoulder the burden of ensuring that all aspects of communications—including networks, modems, electronic mail, PABXs, and long-distance telephone service—are combined to best advantage and operating at their peak.

That's a tall order, and it calls for a uniquely qualified individual, one with a specialized set of skills and resources, and the ability to integrate a complexity of tasks. Some companies are spending many months in search of such a wunderkind, and often they end up turning to outside help after the search proves futile.

It's a dismal picture, but it's not without an optimistic note. Significant developments in almost every corner of the field promise to make management of corporate telecommunications more humanly possible—if not downright easier—for those who stay on top of the lightning-fast changes.

And that is the *raison d'etre* for *Computer Decisions'* first special telecommunications issue: to help telecommunications managers, MIS directors, and, particularly, officers of corporations sort out the information and take control of communications to produce real savings and increased productivity—and to keep systems up and running. As communications products rapidly improve, those who keep up with the changes—and therefore, make the most informed decisions—are the most likely to thrive.

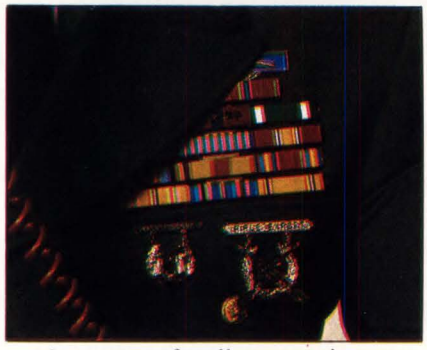
The most evident and far-reaching of these changes, of course, has come in long-distance telephone service. Competitors of AT&T Communications, which enjoys 94 percent of the long-distance market,

A TOP PRIORITY

have sprung up like wildflowers, raising a baffling question among corporate users: Can organizations benefit from MCI, GTE Sprint, ITT, and other whippersnappers that are touting alternatives to the service decline that has come in the wake of the giant's reorganization? The breakup gave all these carriers access to the same lines as AT&T, but organizations using these new services won't enjoy the same ease of use until 1986. The pundits can't agree on what the future holds for customers, but they do agree that the next five to 10 years will be eventful ones for major business users of long-distance services. Turn to page 28 for coverage of this unfinished story.

Despite the uncertainties about communications that AT&T's breakup has created, customers can be sure that telephone costs will remain high in the foreseeable future, and that's bringing about change in another aspect of telecommunications—the *private branch exchange*, or PABX.

The PABX is attracting a lot of attention for several reasons. First, it has evolved from a simple telephone switch to an all-purpose switch that can increase communications efficiency and usefulness. Second, more vendors than ever before—both from the United States and abroad—are in hot pursuit of niches in the PABX market, which suddenly opened up due to the AT&T divestiture. Finally, the new need for self-reliance in management of telecommunications encourages investment in technology that integrates communications with computers and peripherals. (Turn to the article on page 84.)



Managers of call-accounting systems are also experiencing the reverberations of the divestiture. Corporations with upward of 500 telephone lines stand to lose a great deal of money paying for phone lines that are not being used, so they have begun marshalling their own equipment. The most sophisticated call-accounting systems—which include stand-alone, remote, and mainframe—perform that task for them, and also write and track equipment and service orders. A list of these systems forms the centerpiece of this article, which begins on page 16.

Computer-based messaging is also important because of its ability to chip away at the phone bill. Not only can this technology link distant segments of a corporation for instant or convenient communications—shaving travel costs—but it can also keep communications clear and concise. As one source who received and answered 62 messages in one evening said: "I've endured single phone conversations that lasted longer—and I wasn't sure what was said at the end of them."

Some experts predict that artificial intelligence, a greater variety of available systems and features, and the widespread use of personal computers will lead to a boom in computer-based messaging; others assert that the need for a central computer goes against this decentralization trend. The arguments begin on page 100.

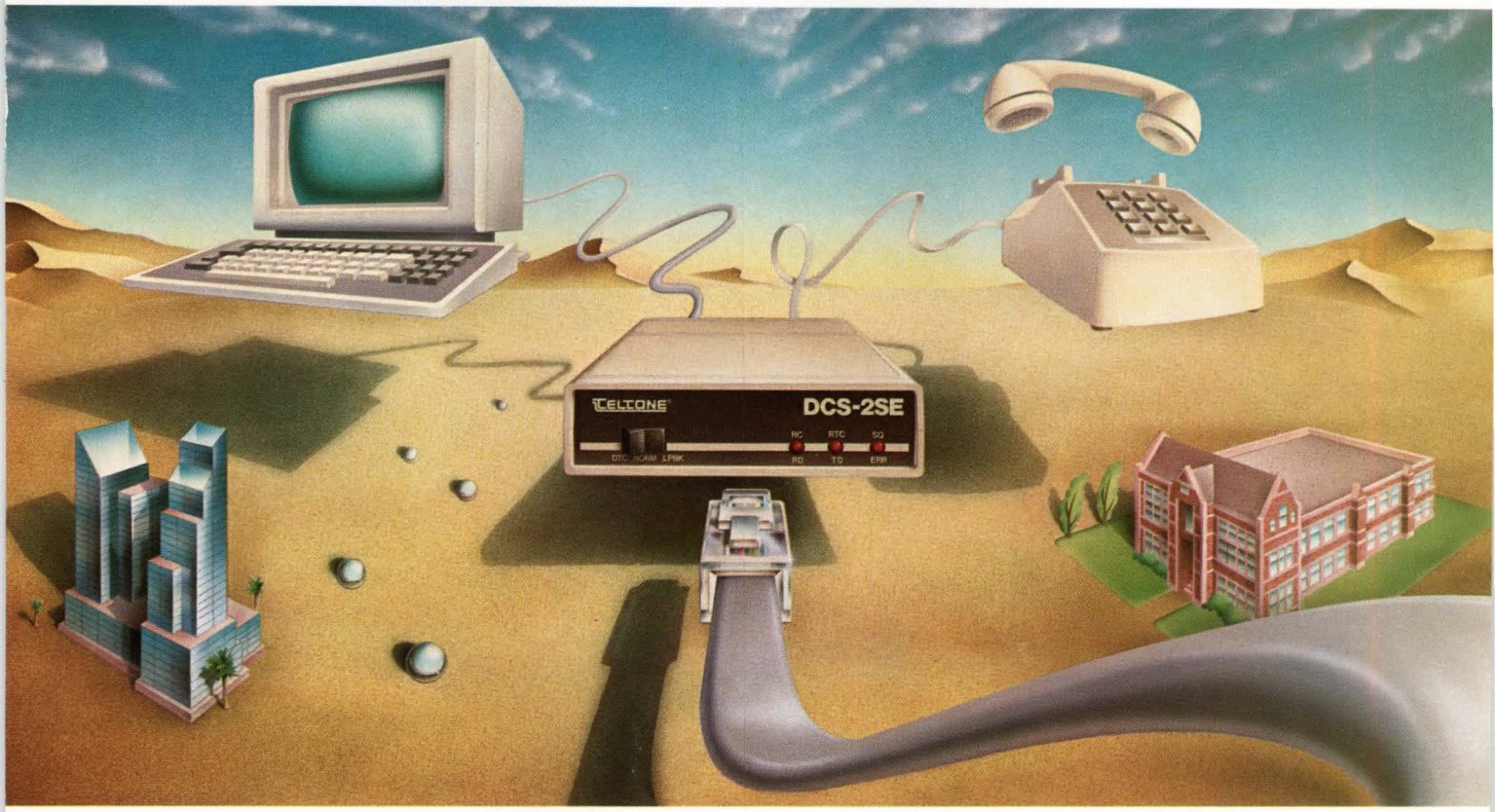
Improvements in modems for personal computers are largely contributing to better, cheaper communications, too. The crux of microcomputer communications, these devices have steadily increased in speed and capability in the last couple of years, and future advances in chip technology will lower their price. Sporting more automatic features and speeds of up to 2,400 bits per second, today's modems are the key to BFC (better, faster, cheaper) communications between personal computers. These changes allow executives to have the best of both worlds: They can carry a portable computer with them while an intelligent modem remains at the office to answer the telephone and store messages. (The article begins on page 116; a list of modems for personal computers is included in the rear of the issue.)

And portable terminals and computers are offering other exciting productivity-raising changes. Portable computers, of course, offer the same communications features as portable terminals, with the added capacities of memory and data manipulation. Many end users, who until very recently were using portable printing terminals in their homes to tap into central computers, are switching to portable computers. The development of small, light, and inexpensive personal computers, which cost under $1,000 and weigh less than 10 pounds, is making a big dent in the traveling communications market, which was previously dominated by portable terminals. However, out on the dusty road or in locations remote from a central computer, few microcomputers have yet met the requirements of cheap and rugged portability that would induce users to make the

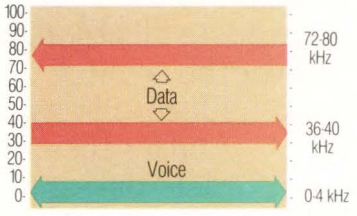
(Continued on page 14)

"Wizardry is expected from managers whose biggest problem a year ago was connecting with the right AT&T representative."

Can you picture a local voice/data network that is powerful, practical and priced right...even for very small groups of users? It's real. And we've installed more than 40,000 channels.



That's right. At Teltone, we've been showing companies large and small how to manage growing voice and data networks for years, and "cost-effective" is our middle name. Right now, for example, our Data Carrier Systems are helping more than 400 companies extend the useful lives of their telephone systems by letting them double as local data networks. For as little as $450 per channel, DCS enables users to route synchronous asynchronous data, at up to 9600 bps, to virtually any existing telephone jack. This makes adding or moving a terminal as easy as plugging in a phone—no modems, no cable, and no disruption of voice traffic at any time. We also offer a full line of high-performance multiplexers and other networking products, but most of all we provide expertise. When you do business with Teltone, you deal with our own applications experts—people who know networking inside out, and share your concern about controlling costs. If this sounds like a good idea to you, let's talk. We have offices nationwide, and we'd welcome a chance to communicate with you.



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CIRCLE 5

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A TOP PRIORITY

(Continued from page 10)

switch. The article on portable terminals and their more powerful relatives begins on page 52.

Two other technologies will have a big impact on the way communications are handled in corporations. But their futures look fuzzy, and managers considering their use should arm themselves with information before advancing on this new territory.

One such frontier is videoconferencing. A hyped technology that has not blossomed as predicted, videoconferencing nonetheless has a few happy users, such as Citicorp, parent of the giant New York-based Citibank. Because videoconferencing requires a lot of bandwidth, which is expensive, only the larger corporations with widely scattered offices can use it cost-effectively. Even then, there are many choices to make as to applications, mode of conferencing—dedicated vs. transportable—setup, and more. The article on videoconferencing begins on page 62.

Lack of standardization is the handicap of the second pioneering technology discussed in this issue: the facsimile machine. Though it is quick, accurate, and easy to use, the lack of standardization has made it in the words of one telecommunications expert, "its own worst enemy." Nevertheless, most experts believe that facsimile will find a comfortable niche in the integrated office—especially in teleconferencing. To learn why, turn to the article on page 92.

The future also promises to produce electronic and voice- mail systems tailored to reflect more closely the way business is conducted (*Computer Decisions*, May 1984). Electronic mail has overshadowed voice mail up to now. But most observers say that voice mail—which has been called the bridesmaid of office automation, due to its failure to achieve recognition—will, like facsimile, play an important role in the office.

"The most far-reaching change has come in long-distance telephone service."

Finally, advances in software are allowing greater flexibility in network control, a function that at this point is "a mess," according to one consultant. Though a few giant corporations are installing their own digital networks so they don't have to rely on communications carriers, most businesses must contend with intolerable service delays and steep costs. But time, education, and more sophisticated products will likely heal those wounds.

Certainly, there has never been such a chaotic period in telecommunications. Changes are coming at such a pace and the options are increasing so rapidly that even the most confident executives are questioning their own decisions—because the penalties for mistakes will be stiff.

Hence, this is the message that runs through this issue: The big businesses that prosper in the brave new world will be those that take charge of telecommunications by making it a part of strategic planning. Because what was not practical last year may become necessary next year, businesses must have enough foresight to embrace the future, and enough wisdom to surrender the past. □

Sally E. Ketchum is managing editor for Medicine & Computer *magazine in White Plains, NY.*

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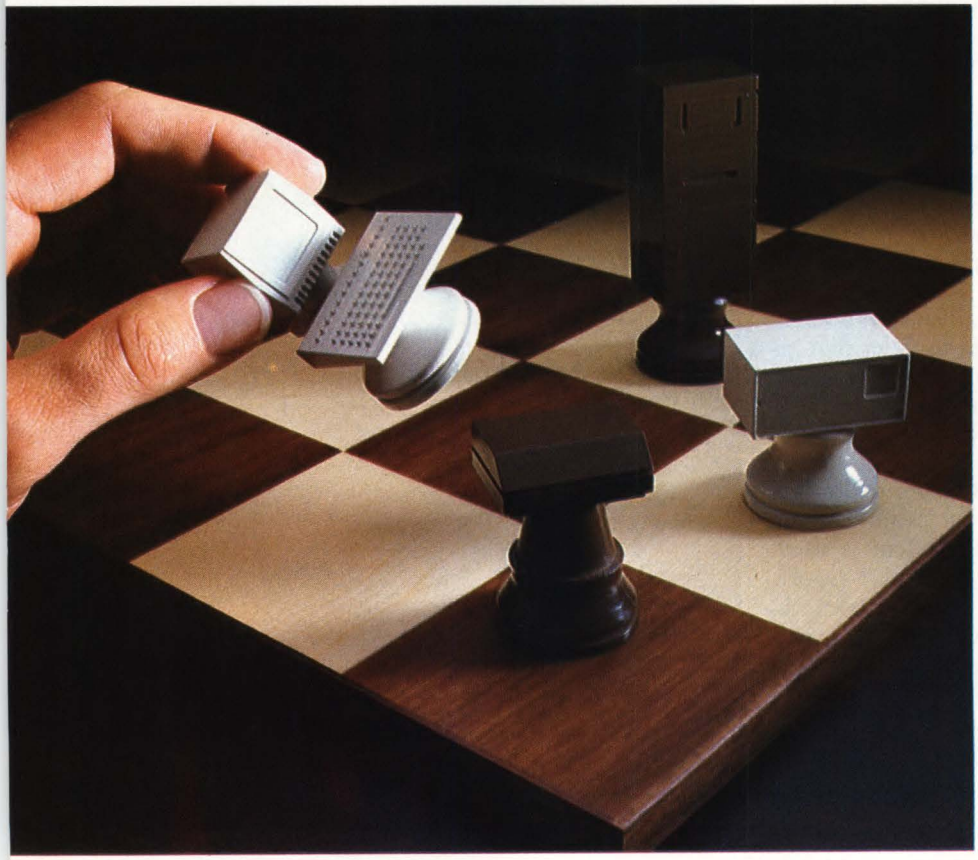

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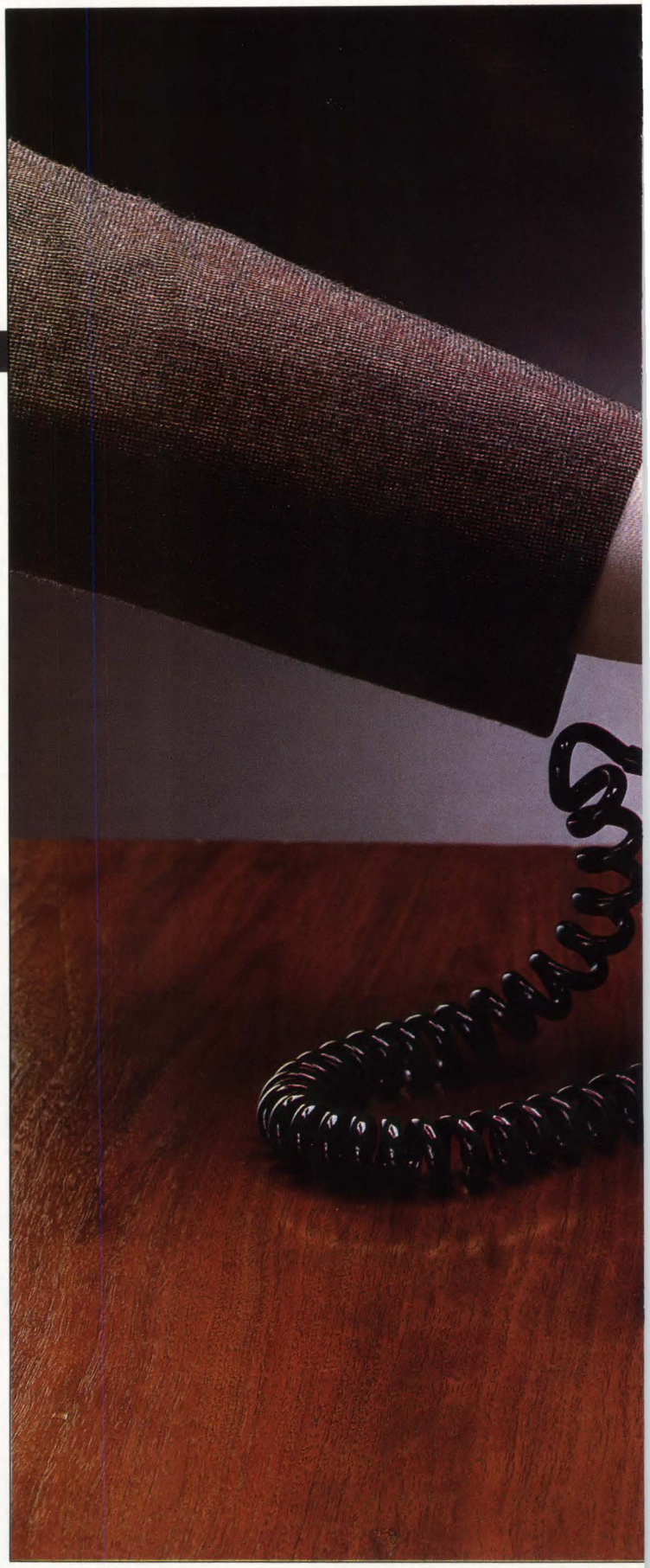
CIRCLE 6

HOW TO SAVE BIG BUCKS ON PHONE CALLS

by Ellis Booker



Business lives on the telephone. Through this single ubiquitous device, orders are placed, sales are pitched, contract details are ironed out, and lunch dates are made. Unfortunately, the price for this convenience is high—many corporations rank the telephone bill as their largest expense, excluding salaries.

Over the years, a multitude of techniques has been applied to the management of company phone facilities. At one time, about all a manager could do to limit phone costs was instruct employees to use the phone in the lobby for personal calls, and send memos urging staff to "use company phones for company business." More recently, technical advances in private automatic branch exchanges (PABXs) allow for so-called "active" controls on a phone network. Active controls, programmed into the PABX's automatic switching, manage the use of the phone network as calls are placed.

The most popular active-control feature is automatic route selection, or least-cost routing. This feature automatically chooses from among the available outgoing trunk lines in the network (WATS, FX, Sprint, MCI, and so on), selects the least expensive service, and completes the call.

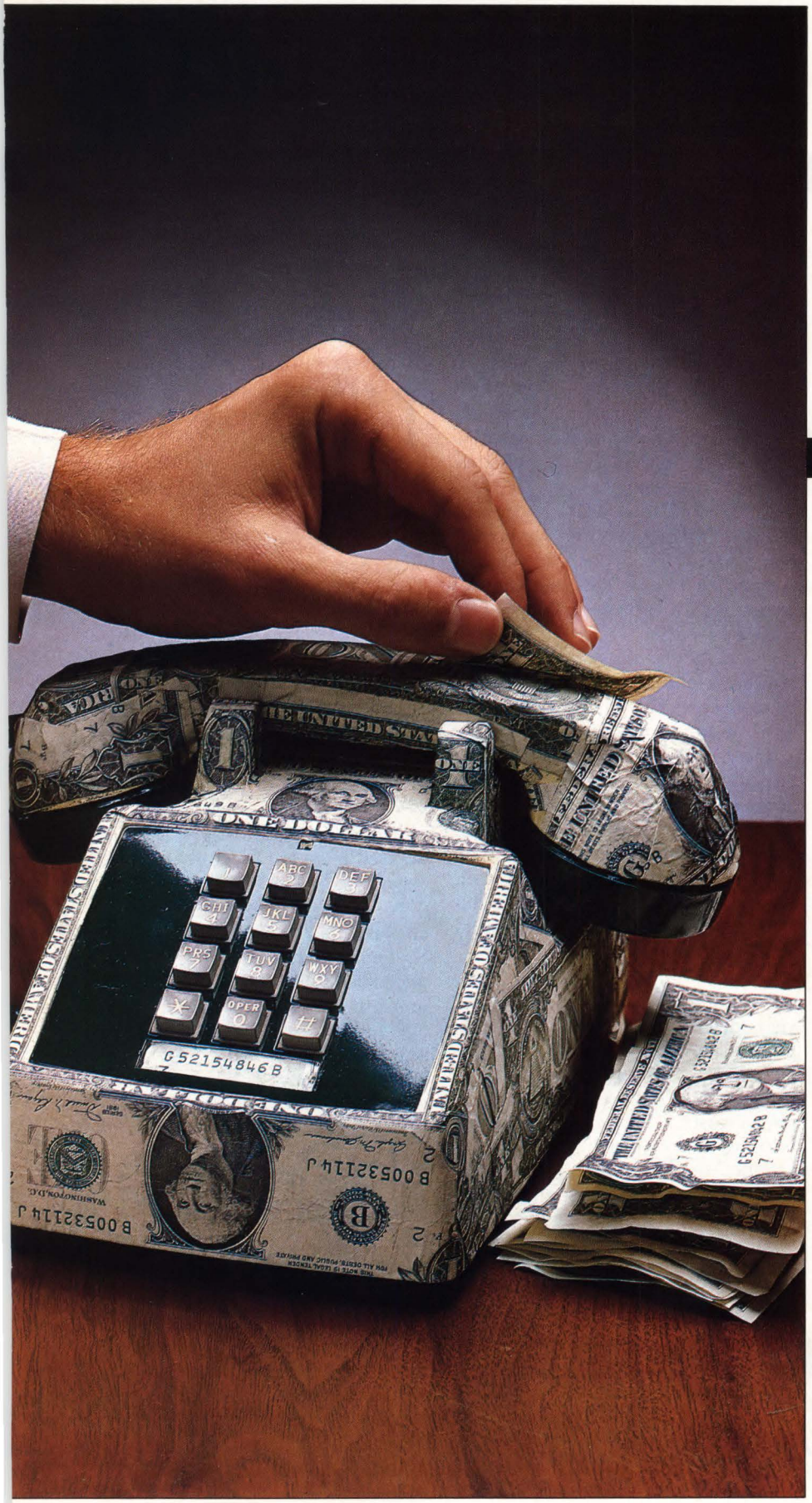
Another popular active control limits certain individuals' or extensions' access to outside lines. Typically, access to the network is obtained by prefixing the call with an account or password code. Such systems are a relatively simple way to prevent employees whose jobs normally don't involve long-distance calls from making unregulated use of the long-distance lines.

Yet another active control automatically inserts a warning beep into the phone line, reminding the caller that his or her conversation has exceeded a specified length of time. If callers don't heed the beep, the same system can be programmed to automatically disconnect the call within 60 seconds.

Active PABX controls can only go so far toward limiting needless telephone use. They cannot, for example, help evaluate the extent to which a phone system is used, abused, or misused. To do that, a manager needs a reporting system—one that details the time, date, type, length, and cost of each call made by every employee at every extension. This is the function of call-accounting systems.

The typical phone user often considers the term *call accounting* a synonym for *watchdogging,* meaning management's way to catch employees who make personal calls on company time. True, preventing abuse is one

Photo by Jeff Glancz



Call accounting is more than a way to police employee phone use; it raises productivity.

purpose of call accounting: Simply knowing that all one's calls are being tallied can induce employees to reduce their personal calls, sometimes by a dramatic 40 percent.

But the benefits of call accounting extend well beyond the curbing of abuse. Armed with an accurate and detailed report of the month's outgoing calls, the telecommunications manager can verify the phone company's bill against an in-house record or can study the traffic distribution over trunk lines to create a more efficient mix of interconnect services. Finally, using a call-accounting system that's integrated with phone-inventory databases, the telecommunications department can more precisely track the number, type, location, and maintenance orders on every item in the network—from individual handsets to trunk and WATS lines.

At one count, there were over 40 vendors of mainframe or minicomputer call-accounting software, more than 150 manufacturers of stand-alone onsite processors, and somewhere between 30 and 50 service bureaus. Each of these methods provides an assortment of call reports. Typically, these are allocation reports, which sort phone usage by extension or department, exception reports, which uncover frequently called area codes and numbers, and network reports, which reveal call activity by trunk line.

Although their costs and techniques differ, all three call-accounting methods rely on data provided by station message detail recording

(SMDR). Sometimes referred to as call detail recording, SMDR is available for most PABX equipment produced after 1979 or thereabouts. It's also available on many of the new key systems. If your PABX lacks SMDR, you can derive the same information through so-called "tip and ring" scanners that sit on the phone lines.

SMDR chronologically records all calls placed through the PABX. Typically, SMDR reports show time of day, date, dialed digits, duration of call, trunk, and, optionally, user-dialed authorization and account codes. SMDR output is transmitted through an RS-232C port to an external recording device. Once collected and stored, the raw SMDR data are combined with the all-important tariff rates to assign a cost to each call. The rated-call record is then printed, sorted, screened, or summarized in reports.

Beyond the SMDR, however, the three forementioned options—stand-alone processors, service bureaus, and call-accounting software—differ widely. The correct system for your corporation depends on the nature of your business, the size of its phone system, and its reporting needs.

Service bureaus poll your SMDR data, by either collecting them directly over phone lines or processing magnetic tape or floppy disks sent from your office. Many bureaus collect the data daily, supplying the accumulated record in the form of hard-copy reports at the end of the reporting period.

Prices for the service vary, usually around one to one-and-a-half cents per call record per month. A monthly minimum charge of a few hundred dollars is common. And the more extensions on your system, the lower the charges per call.

There are upwards of 40 service bureaus in the United States, the majority servicing regional customers. Among the largest are Rolm Analysis Center, United Technologies Telecom MIS, M&SD Corp., and Account-A-Call Corp. Many organizations find it more economical to use a service bureau than to purchase their own equipment.

"We'd like to educate executives about the advantages of a service bureau," says Mike Atlas, chairman of Account-A-Call. "The interconnect companies have been pushing onsite SMDR processors. This is natural, because they understand hardware. However, for many companies, it may be more cost-efficient and convenient to use a service bureau."

The notable advantage of a service bureau is that operation of the call-accounting system is handled fairly automatically. This means that system maintenance and configuration are taken care of for the customer. And managers' time is not wasted creating and tabulating reports every month.

The *Los Angeles Times* has been an Account-A-Call client for several years. Richard Bolenbaugh, telecommunications coordinator for the paper, says use of the system has saved between 10 percent and 20 percent of phone costs. However, Bolenbaugh disputes the claims made by many vendors that systems cut personal calls by 40 percent. "A small business that previously had no accountability might save 40 percent, but a normally efficient business probably won't experience that kind of saving," he says.

A major drawback of service bureaus is that most deliver only hard-copy reports. You must manually input the call-record data to conduct additional analysis. Also, companies that require call reports more often than once a month will probably want to use an in-house system.

The stand-alone processor is one in-house form of cost accounting. Prices and features for these systems vary; some 150 vendors straddle a $1,500 to $50,000 price range.

The least expensive systems are dedicated to call accounting, alone, and are little more than printers attached to PABXs. But companies with more than a handful of lines or extensions need more than this type of system, which provides only a raw chronological record of calls. Thus, the majority of stand-alone processors store SMDR data and print them out in standardized reports. Still other systems are based on popular brands of personal computers, which can also be used for word processing, spreadsheets, and so on.

An example of a low-end, dedicated, processor is AT&T Information System's Teleseer, which was introduced in April of this year. The $8,000 unit attaches to a PABX with up to 500 lines, stores up to 28,000 calls, and provides 11 different reports, which analyze calls by account code, time of day, date, length of call, telephone extension, department, and type of call (local, interstate, WATS.)

Jim Christensen, director of planning and marketing for the Portland, ME, office of the Automobile Association of America, attached the Teleseer to his PABX in April 1984. According to Christensen, the office's volume of calls was reaching unmanageable proportions. "Our auto club has 125,000 members in Maine, and our summer in-coming calls average between 200 and 300 a day," says Christensen, who anticipates his call volume will jump to 3,000 per day this winter.

"One month at the Pentagon, $300,000 of taxpayer's money was spent calling Dial-A-Porn."

With Teleseer, Christensen tracks seven extensions, 40 trunk lines, and both in and out WATS lines. The call-accounting system has enabled him to track each department's responsibility for the monthly $15,000-to-$20,000 phone bill, and, subsequently, to create department phone budgets.

More interestingly, Christensen is using the reports to determine his needs for employees. "We can look at the distribution of calls for specific hours or days, and decide when we need more people to respond to requests for road service," he says.

An example of a stand-alone processor based on a microcomputer is Xiox Corp.'s Tele-Times program, which runs on the IBM Personal Computer, PCjr., and PC XT microcomputers, and is available for systems with 75, 150, and 1,000 phone extensions. Prices start at $2,500.

X-tend Communications Corp. offers a more powerful micro-based system that includes a separate memory buffer. The X-tend CDR comes on an IBM PC XT with 128-Kbytes of random-access memory (RAM), and sells for $5,000 for a 500-extension version. (Including the special RAM buffer and a one-time software license, the product sells for $8,400.)

X-tend's system records up to 9,000 calls per hour, or 200,000 calls from the current month and an equal number from the prior month; the proprietary RAM buffer accumulates 4,000 SMDR records at a time and lets the PC XT function as an ordinary workstation, as well.

The X-tend CDR also lets users watch as calls are made. "Each call through the PABX is displayed on the screen, and is processed and costed right there," says Walter Karopczyz, X-tend president. "Each manufacturer will raise its hand when asked if it produces a station detail report. But what's important is the speed of reporting."

Naturally, Karopczyz advocates real-time microcomputer-based SMDR processors over both mainframe and service-bureau systems. His justification for this involves what he calls the two types of call-accounting users. "The first user is an accountant, who wants to cost-allocate to the phone users throughout the company's network. This is a monthly process. The other user is the telecommunications manager, who must deal with problems in a timely manner. Suppose a complaint comes from the CEO about the quality of a foreign exchange line he or she has just used. An interactive system not only tracks down the problem immediately, but can find, for instance, that what a CEO thinks is a noisy line is actually a malfunctioning WATS circuit."

One user of X-tend CDR is Avon Products. Ed Rochotte, manager of data processing and communications, oversees the 2,001 extensions at the cosmetics manufacturer's New York headquarters. "I examine on-screen activity to determine if I'm having trouble with a circuit," Rochotte explains. If there is a problem, he immediately dispatches one of his two maintenance people to investigate. Rochotte says that, unlike mainframe-based programs and service bureaus, X-tend's real-time reporting lets him detect problems rapidly, without waiting for a slew of network-activity reports at the end of the month.

Like most telecommunications managers, Rochotte is always searching for ways to trim the phone bill. He has taken advantage of the "active" controls on Avon's Bell Dimension System 85 PABX, in one instance programming the PABX not to accept numbers with a '976' prefix. (In the 212 area, this is the prefix for such services as Dial-A-Joke and Weather.) Elsewhere he opted to insert a "beep" into a New York-to-Brazil line: "After 10 minutes, there's a beep, then 30 seconds later the line will disconnect."

One advantage of stand-alone processors is their ability to produce reports on demand, an important feature for organizations like hotels and law firms, which bill back users or clients for phone costs. But a disadvantage of these systems is their start-

(Continued on page 22)

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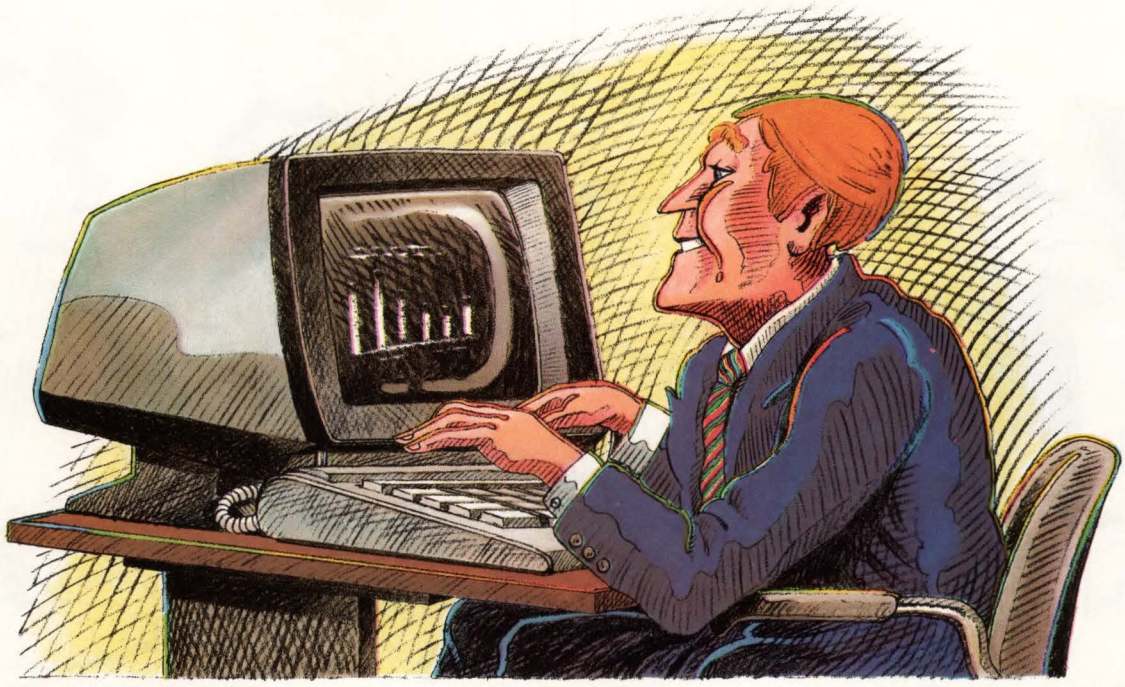

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CIRCLE 7

CONTROL PHONE COSTS

(Continued from page 19)

up cost, which is higher than that of a service bureau. Also, they require a lot of in-house operation and maintenance.

Mainframe call-accounting systems help large organizations with voluminous phone use track and analyze calls. Avon uses a mainframe-based call-accounting system from Communications Design Corp., New York, in its national field offices.

Dennis Murphy, manager of telecommunications systems at Avon Product's telecommunications group, Rye, NY, explains that the system, now installed in a Springdale, OH, field office, will eventually be used in Illinois, California, Georgia, New Jersey, and Kansas. Installed on IBM 4300 series minicomputers, the system will track between 400 and 800 lines per office.

"The system lets us address peaks and valleys in business phone activity," reports Murphy. "For example, in the fourth quarter, we might need to switch Band 3 WATS to Band 5 or convert a Band 2 WATS to MCI. The greatest cost savings come from the control we can exert over such line changes."

"The typical phone user considers call accounting a synonym for watchdogging."

There are legendary stories of employee phone abuse. A recent one comes from the Pentagon, where, reportedly, $300,000 of taxpayers' money was spent one month calling Dial-A-Porn.

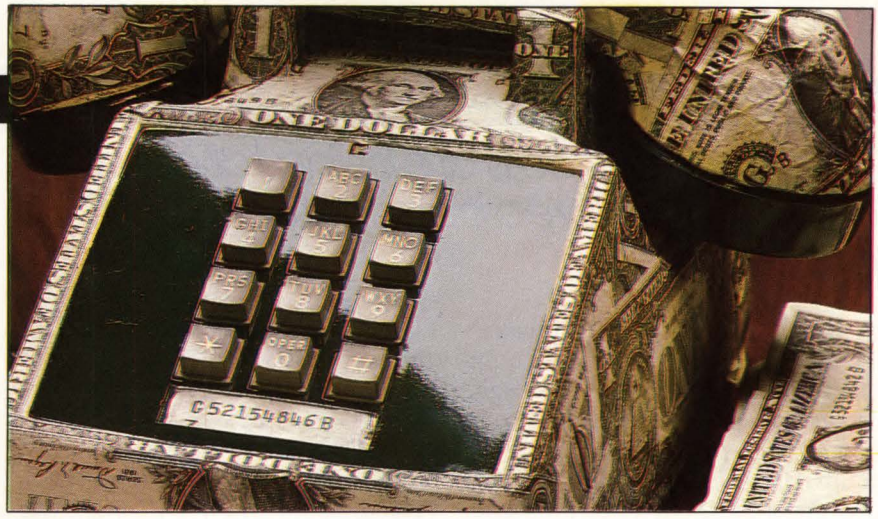
Techniques to uncover abuse include exception reporting, used to unearth unusually high numbers of calls made to a particular phone number or to pinpoint extensions that make calls of unusually long duration.

Employees that take undue advantage of company phones are only part of the problem. Troubling as phone abusers may be, they are probably equaled in number by individuals who are phone *misusers*.

Telephone misuse refers to unwitting acts that reduce the efficiency of your phone facilities. Common examples of misuse are the tendencies to dial direct instead of using the WATS line, and of not typing in the access sequence for one of the money-saving long-distance carriers.

Obviously, guarding against malicious abuse of company phones is a negative use of exception reporting; it can foster suspicion among managers and resentment among employees. But there are positive ways to use this technology. One is to measure employee performance; noting the number and average duration of each call made by a sales representative is a good indicator of how much effort he

A local area network doesn't



or she is dedicating to telephone solicitation.

Even authorization codes—those several digits beyond the actual number dialed—can be put to productive use. Kevin McLinden, a consultant for Sears Communications Inc., Rolling Meadows, IL, describes one debt-consolidation firm that used these codes to monitor calls. Employees were trained to dial a code along with the phone number. The code related information about the type of client, sort of transaction, and so on.

Other active PABX controls include the ability to restrict access to specific numbers. For instance, canceling access to numbers like Dial-A-Joke, Weather, and Time can eliminate certain kinds of phone abuse. Of course, you should exercise restraint in making certain numbers *verboten.* Thus, although a manager could request that the home numbers of all the employees in his department be put on the list of taboo numbers, for employee-relations' sake, he would be ill-advised to do so.

The popularity of in-house systems, both mainframe programs and stand-alone processors, can be attributed in part to the effect of AT&T's divestiture. "The manifestation of the split-up was that every company became a multi-vendor shop," says Anthony G. Abbott, president of Commercial Software Inc., New York. "Consequently, all the records of what equipment is installed, what is connected where, and whether the monthly bill is accurate has reverted to the users."

Abbott thinks this new situation will bring about a more global definition of call accounting and telephone management. In particular, he contends that maintaining inventory records and monitoring the flow of service orders placed to multiple phone-line and equipment vendors will be the challenges of the near future.

Indeed, Commercial Software is one of several vendors marketing a telemanagement package. According

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CIRCLE 8

CONTROL PHONE COSTS

"Knowing that calls are being tallied can reduce employee personal calls by 40 percent."

to Abbott, Commercial Software's TEMS (Telecommunication Equipment Management System) package assists in preparing and tracking communication work orders, maintaining equipment inventories, and reconciling vendor bills. "Up until now," concludes Abbott, "the efforts to save costs have focused on the 60 percent to 80 percent of the bill reflected by long-distance charges. Our soon-to-be-announced inventory- and maintenance-management systems will help save on the rest of the charges."

Another telephone-management system comes from Aud-Cyn Associates Inc. in Parsippany, NJ. The ITCS (Interactive Telecommunications System) is an online version of Aud-Cyn's mainframe-based TCS program. Aud-Cyn, a service bureau and software vendor, offers ITCS for the Hewlett-Packard 3000 computer. Its price ranges from $54,000 to $90,000.

Chase Manhattan Bank in New York will soon go online with ITCS. According to Cathy Maloney, vice president of communications, Chase has been using an in-house version of Aud-Cyn's call-accounting program for nine years. "But an interactive system is now needed to track our inventory and wiring plans. People in operations can't remember all the vendors they're using. You need an interactive system to assist, telling you, for example, who you need to contact for equipment or line service, and what contracts apply."

Maloney stresses that no matter how sophisticated the reports and summaries produced by a call-accounting system, the job of improving the system's efficiency is still in the hands of managers, and in how they use the information provided by the reports. Certainly active PABX controls like automatic route selection, call restrictions, time-triggered warning tones, and so on have cut costs considerably. "But," Maloney says, "a telecommunications department doesn't ordinarily review a phone bill and tell a user 'you're a bad boy.' Rather, it brings problems to the attention of managers. Therefore, educating all managers about telecommunications is going to be more important from now on."

Relying on an expanding concept of call accounting, companies are stemming the tide of phone abuse and misuse, as well as getting the best value out of their phone systems and their employees. □

Ellis Booker is a free-lance writer based in New York.

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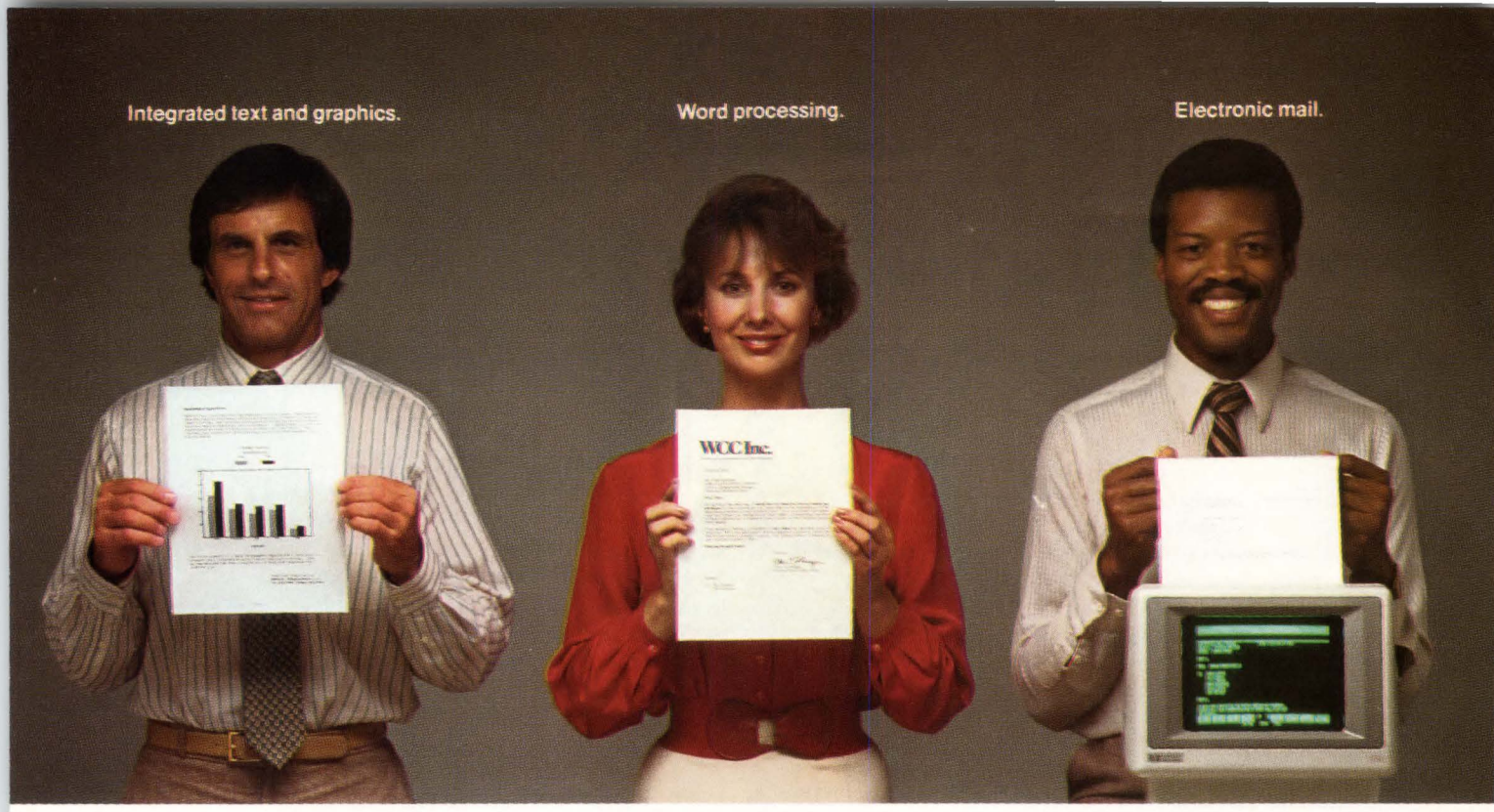

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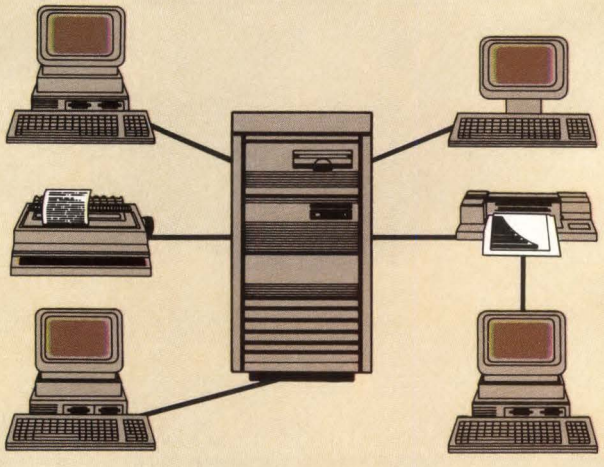

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CIRCLE 29

LONG-DISTANCE SERVICES

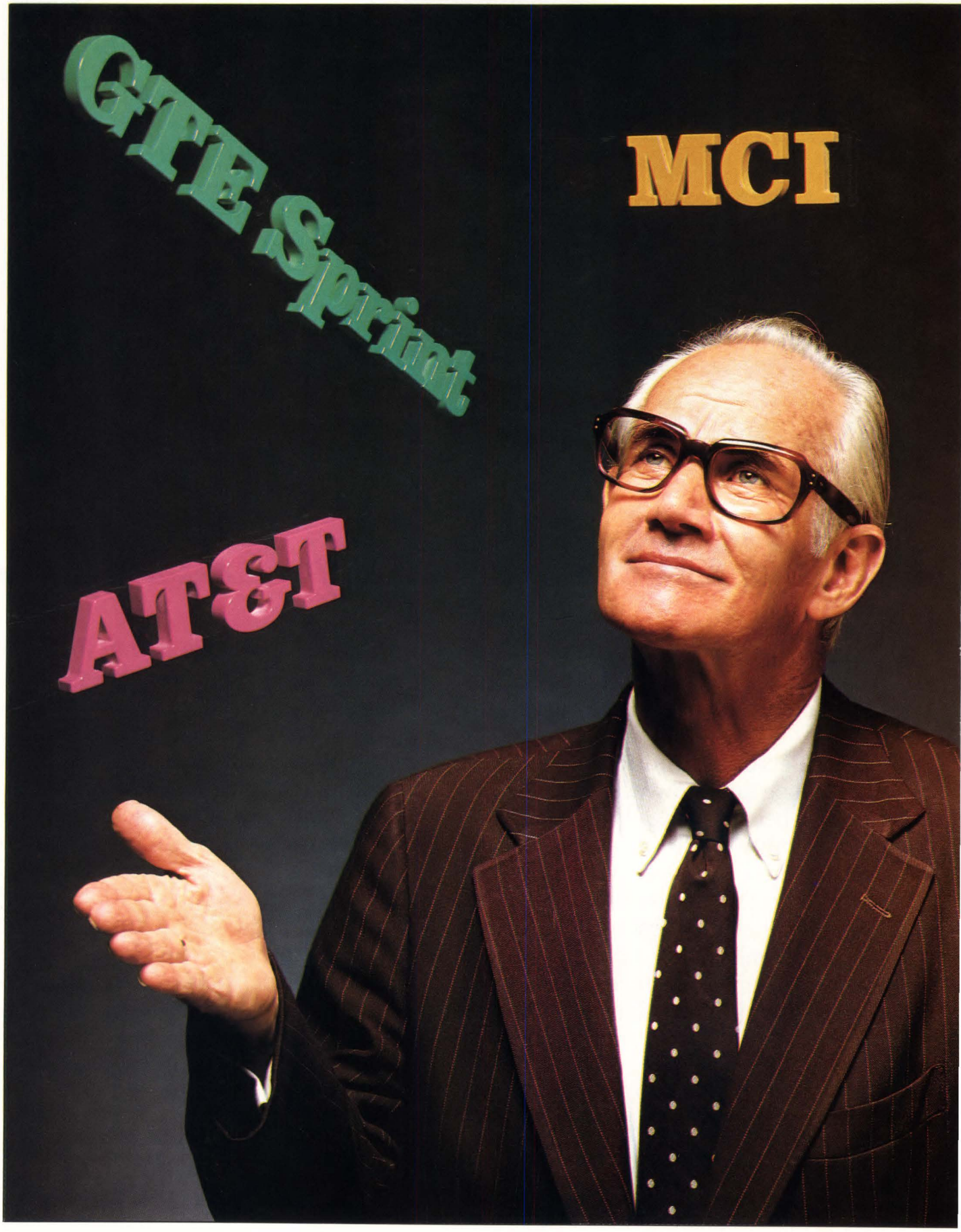
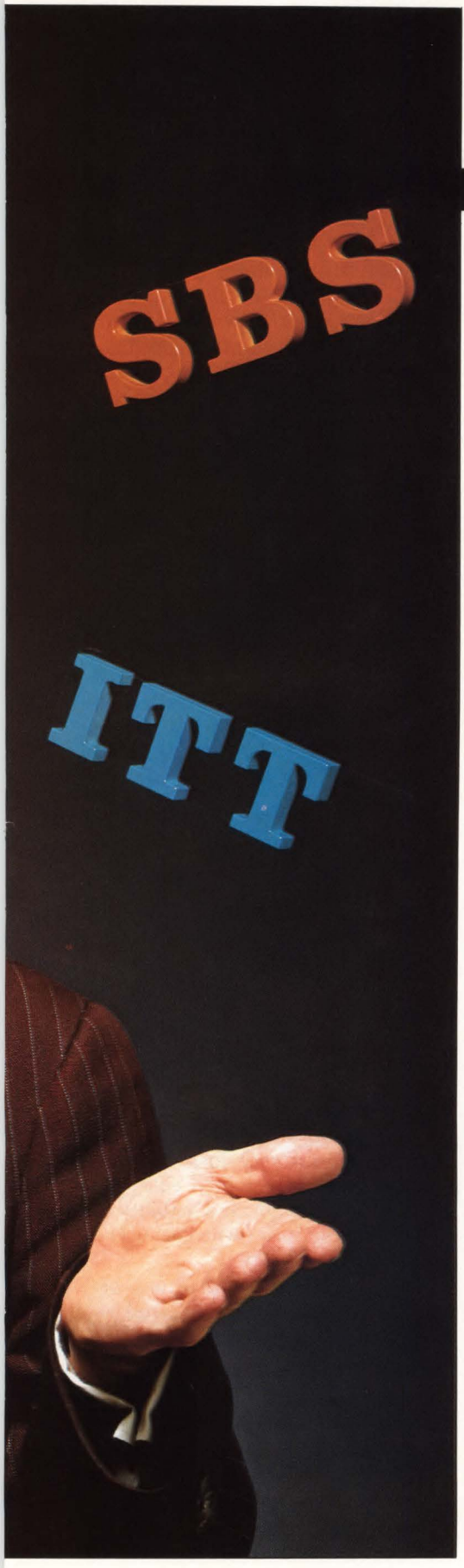


Photo by Bill Oliwa



IS PRICE THE ONLY QUESTION?

Service and reliability, not low rates, may be the be-all and end-all for your organization.

by Ara C. Trembly

About 400 vendors are vying for the privilege of helping your organization reach out and touch someone with long-distance telephone service. But although you may believe that means you're in a buyer's market, don't be deluded. It's not easy to decide which outfit will give you the biggest bang for your buck.

Most businesses, however, cannot be easily coaxed away from the familiar arms of the former Ma Bell. For, until two years ago, AT&T was virtually the only game in town for many areas of the country.

AT&T's monopoly was disintegrated it when signed a consent decree to settle an antitrust suit brought by the U.S. Department of Justice. The decree ordered a separation of local Bell System operating companies from AT&T and attempted to establish "fair" market competition among long-distance carriers via the concept of "equal access." Under equal access, local Bell operating companies are required to provide the same quality of service to all long-distance carriers. Divestiture was accomplished early this year, and implementation of equal access—under which all businesses and individual customers will be required to choose a primary long-distance carrier—is under way.

By 1986, once a corporation chooses a carrier, the local phone company will make the adjustments to allow customers to call long-distance by dialing "1" plus the area code and number. Choosing one carrier, however, doesn't preclude using other long-distance carriers. That can be done by simply dialing a series of five digits to access another carrier's lines. In addition, if a corporate customer isn't satisfied with its primary carrier, it can easily switch services. The changeover is free during the first six months of phone service.

All telephone customers must choose a primary long-distance carrier during the 90-day period prior to implementation of equal access in their regions. With so many alternatives available, the competition among the carriers has been intense, spurring a price war.

Because business calling is responsible for an impressive portion of the 700 percent increase in long-distance usage since 1962, the long-distance competitors are all aiming at the same target: your corporation. And they're claiming that their services will save your business money.

But can they? Yes, according to the new long-distance carriers. MCI, Bell's nearest long-distance competitor, advertises rates 40 percent lower than those of AT&T. GTE Sprint, the second closest contender, says its rates are 30 percent below Ma Bell's. Allnet—a reseller of long-distance service (as are the majority of the 400 carriers)—is third in the long line of companies trying to compete with AT&T's services. Allnet claims quite blatantly that it offers the lowest prices in the nation.

"Companies change long-distance systems for one reason and one reason only—to save money," asserts Harry

Newton, publisher of *Teleconnect*, a New York-based magazine. But the alternative carriers are not always less expensive. "They can be cheaper, but they can also be a hell of a lot more expensive," Newton observes. "There are some places in the country where calling through an alternative carrier can be twice as expensive as using AT&T." That can happen when the user of an alternative system makes off-net calls (calls directed to areas where the carrier has no direct lines).

"Most users of alternative long-distance systems claim they're saving money, but 95 percent of them don't bother to find out how much they're saving," Newton insists. Part of the problem is that long-distance rates are constantly changing, as carriers find new ways to reduce costs (or are forced to raise prices when the government imposes higher access charges).

"These companies change their long-distance rates as frequently as I change my underwear," quips Newton. And, according to Michael P. Richer, chairman of Allnet, "Rate confusion is an advantage to AT&T. With such confusion, it's easier for the customer not to do anything, and a nondecision will in most cases keep the user in the AT&T camp."

Newton also points out that some alternative long-distance services are comparing their rates to those of AT&T direct-dial service. Most businesses, however, are using WATS Wide-area Telephone Service lines. "WATS is usually 25 percent below direct-dial, so it's a tossup," he explains.

Although price may be the most influential factor in choosing a long-distance carrier, customer satisfaction must rate a close second, especially with rates that change frequently. "Quality of service was very important to us when we switched to MCI," says Marlaina Warren, manager of voice communications for Comshare, an Ann Arbor, MI-based vendor of software and timesharing services. Comshare has been using MCI for two and a half years and Warren reports that her organization is "very satisfied" with the carrier's service.

Washington-based MCI boasts a 3 percent share of the estimated $40 billion long-distance market in the United States. A terrestrial microwave-communications network is the backbone of the MCI system, although fiber-optic cable systems are also being established in some areas of the country. A 12-digit access code is presently used to gain entry to the MCI system, but the code (as well as the codes of other carriers) will no longer be needed after implementation of equal access. In a recent advertisement, MCI claimed that 389 of the Fortune 500 are using its services and saving money.

"We've saved a lot," says Warren. "When we first switched, we were saving $800 to $1,000 a month using MCI WATS instead of AT&T WATS." Comshare also uses MCI's dialup service, and although she admits the transmission quality is not as good as AT&T's, Warren maintains that the loss in quality is more than compensated for by the lower rates.

"The conventional wisdom is that alternative long-distance carriers have poorer transmission quality than AT&T," says Newton. "In most cases, that's true, but it depends on your location. In some areas the transmission quality with alternative systems is even better than AT&T's."

Newton scoffs at the idea that those who select an alternative long-distance service are taking a risk. "Not only do the alternative companies charge less, but they're often more efficient than AT&T," he states. "They have fewer people doing the same work; there's less bureaucracy, less hassle. They also have the luxury of being able to buy the best equipment. AT&T is locked into using whatever Western Electric now AT&T Technologies makes."

Grace Shipp is communications manager for another satisfied MCI customer, the Remington Hotel in Dallas. Shipp notes that her organization made the switch last year because of the poor transmission quality it was getting from the local Bell operating company. "We handle quite a bit of long-distance calling, and this change has really made a difference," she says, citing auditory quality as good as or better than AT&T and savings of up to 25 percent on domestic long-distance calls. Because MCI doesn't yet provide overseas service, the hotel must rely on AT&T for those calls, but Shipp complains that AT&T's service is not good.

Shipp and Warren agree that the installation of MCI lines caused no stir in their operations. "Most of our staff don't even know we have a new system," says Shipp.

Norman Woodworth, general manager of First of Georgia, an insurance company based in Tampa, FL, is less enthusiastic about GTE Sprint (Los Angeles). "Sprint barely beats Pony Express. It caused us a lot of frustration," he says.

Woodworth's organization used Sprint for four months before switching to Allnet several months ago. Among the problems he claims to have experienced with Sprint are telephone connections that go dead, frequent busy signals (indicating that Sprint's long-distance lines are tied up), poor auditory quality, delays in getting calls through, and inability to get through to Sprint when using the 13-digit access code.

Telecom Library, Newton's or-

"To Ma Bell, I'm just another phone number."

—Warren, Comshare

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CIRCLE 11

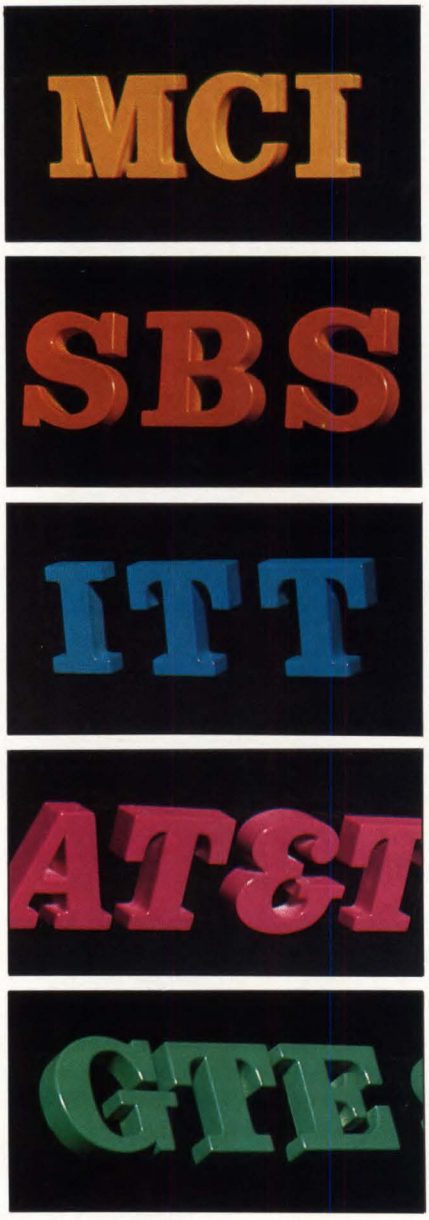
ganization, uses Sprint for staff on the road to avoid high rates incurred when calling from hotels. Newton emphasizes that location is the key to rate. "In New York, I wouldn't touch Sprint," says Newton, noting that the carrier sometimes is unable to meet the demand for use of its lines, thus making calling a dubious adventure. "In other areas of the country, though, it makes sense."

Transmission quality varies dramatically with Sprint, according to Newton, who has used the carrier for three years. If demand for use of the lines is high, quality may suffer, and other factors (such as weather) may also have an effect. "Generally, AT&T transmission quality is better, but when conditions are right, Sprint can be just as good," Newton emphasizes.

Norman Woodworth notes that he has experienced some problems with static while using Allnet, but he adds that the difficulties have been traced to local GTE phone lines. "Allnet provides good long-distance service at a low price," he says. "There's no comparison to GTE Sprint."

Allnet also offers volume discounts and charges no monthly fee. Instead of using its own communications network, Allnet purchases huge amounts of long-distance service from other carriers (like MCI and Sprint) at wholesale rates. It then resells the services to subscribers at the lowest possible price. Because the company doesn't depend on a single network, more lines are open at any given time.

Like many resellers, Allnet is purchasing its own equipment and building its own system. "Would you rather be a tenant or a landlord?" asks Newton. "Eventually, the wide disparity in phone rates is going to narrow, and that will cut into the profits of resellers like Allnet, Chicago, U.S. Tel, Dallas and Western Union, Upper Saddle River, NJ. A reseller that doesn't plan to build its own facilities needs its head examined."



"I noticed the improvement the first day we started using Allnet," states Woodworth. "And Allnet's transmission quality is comparable to AT&T's, except when we have to use GTE lines." In those cases, he notes, voices are not as clear and there may be static. In addition, the caller must take care to keep the phone close to his or her mouth and to speak clearly.

Woodworth adds that with Allnet calls can be made in half the time it takes with Sprint. "Our employees were so frustrated with Sprint that they wouldn't even use it, but we're really pleased with Allnet." As to any risk involved in switching long-distance carriers, Woodworth points out that because the service he was using wasn't working, a change could only bring improvement.

Allnet still claims to have the lowest rates, but Woodworth has been approached by another carrier that claims to beat Allnet's rates, without using GTE lines. For the moment, however, Woodworth plans to stay with Allnet because "we're getting good service."

What does the future hold for the *user* in the mad scramble for long-distance business? While the big three alternative carriers are dominating in sales, other services like Satellite Business Systems, McLean, VA, and ARGO, New York are taking advantage of satellite technology to build their own communications networks. And, while AT&T delights in pointing out that alternative carriers don't offer amenities like information and operator services, a number of carriers—particularly MCI—are moving toward providing those services at lower rates than AT&T.

"AT&T is going to lose more of the long-distance market share than it already has," Newton predicts. "It has lost 7 percent so far, and it will probably end up losing 15 to 18 percent. Then the situation should stabilize.

"There haven't been any new ideas in long-distance service for the last 20 years," Newton concludes. "I look forward to the day when there won't be any busy signals everyone will have call-waiting and I can see the person I'm talking with. The technology is there, so it's just a matter of time." □

Ara C. Trembly is a free-lance writer based in Metuchen, NJ.

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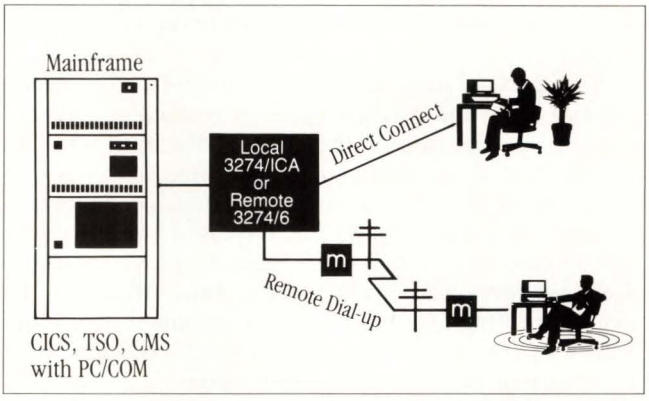

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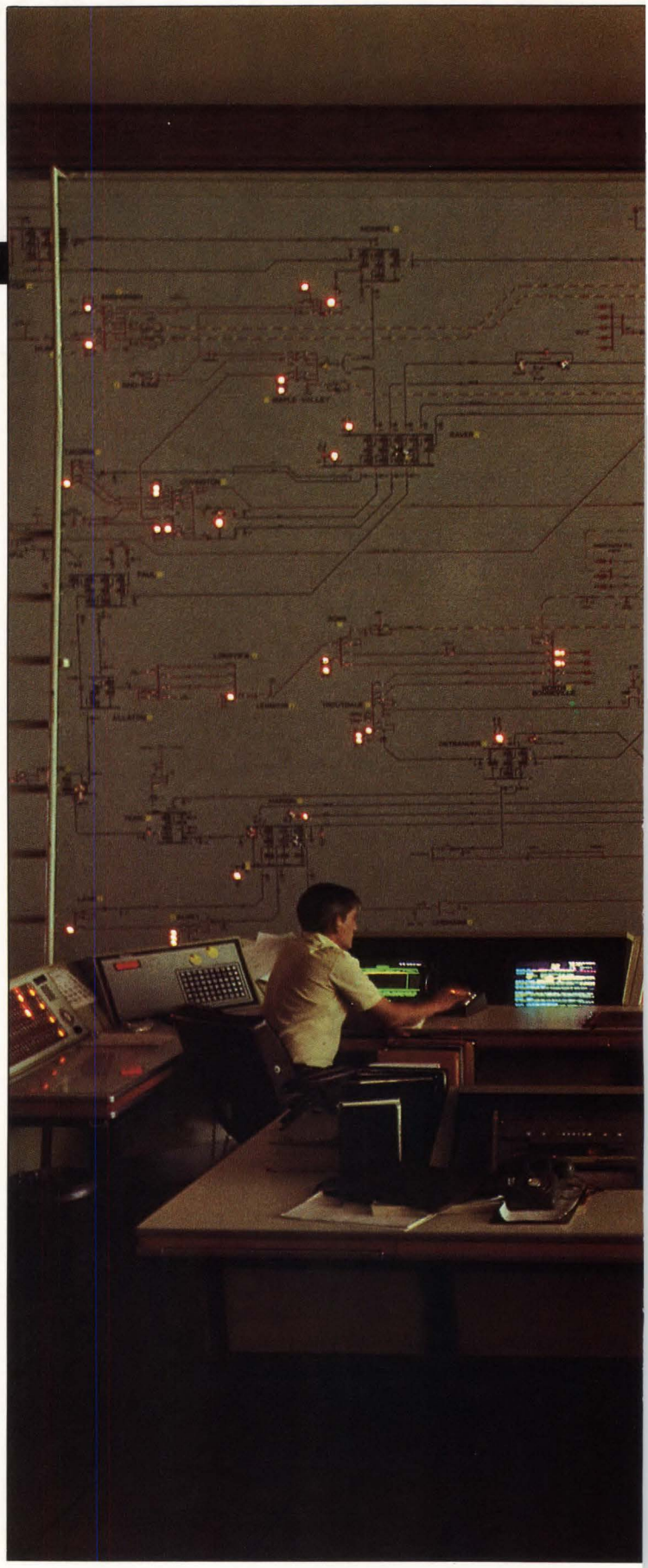
CIRCLE 12

SPINNING A GLOBAL WEB

by Gary Stix, Associate Editor



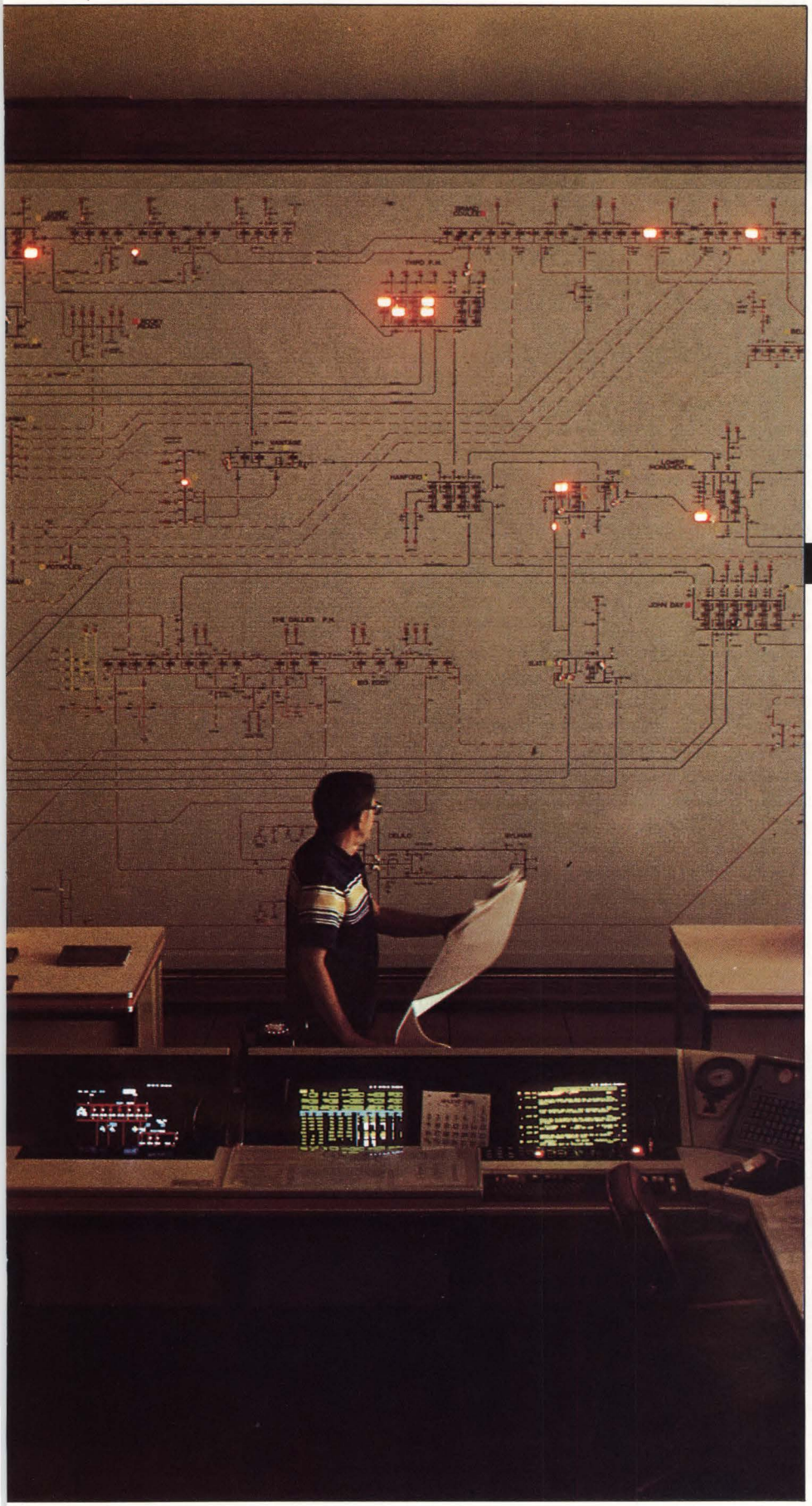
Though all roads once led to Rome, latter-day empire builders are stringing together data highways that together office and factory sites as far afield as Kalamazoo and Timbuctoo. The nation's corporate behemoths are adapting to a brave new world of telecommunications with plans for steadily expanding information networks. The need is evident: Manufacturers, strapped by rising domestic labor costs, plan moves to less-costly locales abroad and the internationalization of wholesale banking continues, despite a rash of bad foreign loans. Moreover, users of older networks must make independent—and often incompatible—networks talk with one another.

This drive by major corporations to spin a global web of coaxial cable and satellite relays is proceeding on a note of caution. Because of the AT&T divestiture and the difficulty of implementing overseas communications, the job of the corporate-communications manager has become prickly. "The single largest challenge is to predict and plan costs in the near term," says Chuck Jones, vice president for telecommunications at Holiday Inns, Memphis, TN. And projecting future outlays can become as convoluted a task as unraveling the spaghetti pot of overhead wiring on a turn-of-the century telephone pole.

Service looms as an imposing question mark. Day-to-day management might be characterized by the refrain, "Brother can you spare a line" as business users wait weeks, which stretch into months, for installations of leased lines. The technology is here; the service often isn't. The harried business user isn't the only victim. State governments have lost millions of dollars waiting for installation of leased lines to important revenue sources like online betting terminals.

Service delays have resulted in a flurry of bypass feasibility studies. And bypass, the circumventing of local phone networks, has become a practical alternative. More than 30 percent of the nation's 500 largest corporations are using some form of bypass and 13 percent more expect to follow by 1987, according to the Eastern Management Group, a Parsippany, NJ, consultancy. While a restive Federal Communications Commission looks on, the large corporations that are the phone companies' biggest users claim they're still inextricably wedded to mainstream phone companies for all but a small percentage of carrier services, such as intercity networks. James J. Sobczak, a vice president at San Francisco-based Bank of America, maintains that current and projected revenue losses will be minimal. "There's no reasonable alternative to the local loop that'll get you into homes and businesses," Sobczak says.

Photo by Chuck O'Rear/Westlight



Steadily expanding networks let giant corporations stretch around the world to capitalize on new opportunities.

The problems attending the dismemberment of the Bell System may be matched by the fickleness of overseas Postal, Telephone and Telegraph (PTT) administrations. Bank of America, Ford Motor Co. (Dearborn, MI), and other major corporations attempting to install international packet-switched networks must plan significant lobbying efforts to curry favor with PTT officials.

As always, there's high demand for clear-sighted managers to navigate the hazardous shoals of deregulation. Telecommunications, once assigned to the office administrator or a poor relative within the data-processing department, may now gain its own departmental designation. But plans for autonomous operation often die in the futile search for qualified personnel. Some users respond by attempting to automate network management with an array of diagnostic software and hardware tools. This solution, too, may prove impractical. To maintain network-management devices, says consultant Don Gooding of Boston's Yankee Group, "the user may be devoting more people with a higher level of skills than most corporations already have." The ultimate solution may be to recognize that there is no solution. Echoing the sentiment of managers and consultants alike, Gooding comments: "Some corporations have no choice but to mud-

dle through."

How are managers to cope with the problems and challenges brought about by the rapid changes in teleprocessing and communications? A look at the approaches taken by officials at major corporations in key industries may help managers who are implementing systems avoid pitfalls and improve efficiency.

AMERICAN AIRLINES

The rough-and-tumble competition that's prevailed in the airline industry since the Airline Deregulation Act of 1978 has made the business of providing commercial air service a precarious one. Witness the troubles of Continental, Braniff, Air Florida, Republic Airlines, and others. One exception is American Airlines, Dallas, the nation's second largest commercial carrier, which currently has the industry's highest profits and return on shareholders equity.

Although American occupies the number-two slot in market share, it's the resounding leader in automation. Its Semi-Automatic Business-Related Environment (Sabre), the dominant airline-reservation system, reportedly furnished the carrier with more than $100 million in revenues last year. "I like to say that American has two products," says James Marston, American's vice president for data processing and communications services. "Our first product is air transportation and our second is automation."

Sabre, although it existed previously for the airline's own reservations needs, came into being as an airline-to-agent reservations systems in 1978, just before deregulation. (Marston maintains there's no relation between the two events.) The airline industry recognized the benefits that would accrue to the airline that succeeded in convincing agents to choose one carrier's reservations network over that of another. The winner of the battle of the agents could gobble up market share by ensuring that its flights would be listed first on an travel agent's terminal. With an understanding of its strategic importance, American reportedly committed to the project as much as as $160 million. "That's probably a conservative figure," Marston says laconically.

American's investment paid off handsomely, making it the hands-down winner in the battle of the reservations systems. Of the some 19,000 automated travel agencies nationwide, more than 40 percent use Sabre, says Marston. The Apollo system from United Air Lines, Mt. Prospect, IL, in second place, has grabbed only 27 percent of the market. The rest of the agencies are served by Trans World Airlines, New York, Eastern Air Lines, Miami, Delta Air Lines, Atlanta, and some smaller vendors.

Travel agents may have chosen Sabre because of its built-in frills. Besides simple flight reservations—with American flights listed first, of course—Sabre lets agents book Broadway shows, hotel rooms, and car rentals. It even lets a well-wisher send flowers to a passenger. (The systems' built-in bias was modified last summer by a Civil Aeronautics Board ruling. As a result, airlines are prohibited from giving their own flights preference on the reservations networks.)

The airline industry has been called a technology glutton, and if that's so, American Airlines is the pig of the poke. "There are so many things about the world today that haven't kept pace with our needs," Marston boasts. "The state of the art in computer technology hasn't advanced fast enough to support our plans. No other business in the world today can equal our transmission rate of messages per second." Even among its competitors, which include an ample share of automation devotees, American distinguishes itself by its insatiable demand for more processing power, greater line speeds, more, more, and more. When the Joint Airline Development Effort (Jade) began in the late 1970s, American nearly dropped out because other airlines couldn't meet its demands for more. (From Jade came the Transaction Processing Facility, which has been adopted by many banks that need high-volume message processing for their automatic-teller-machine networks.)

Through joint software devel-

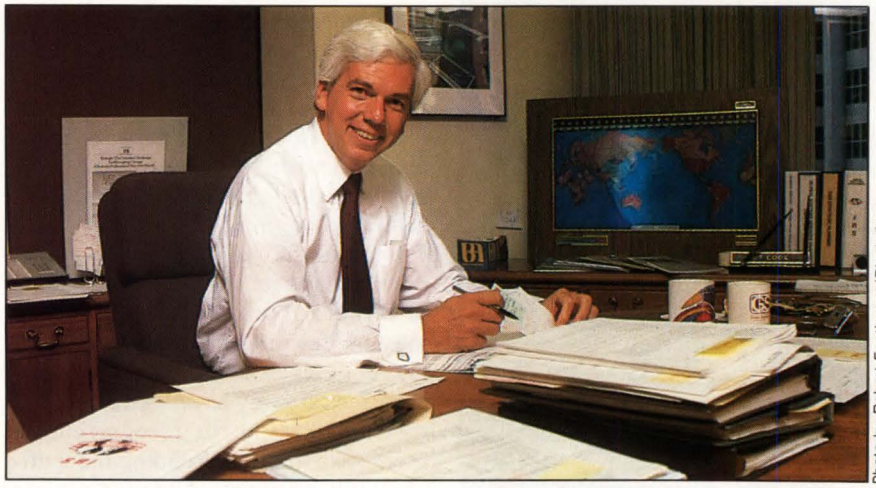
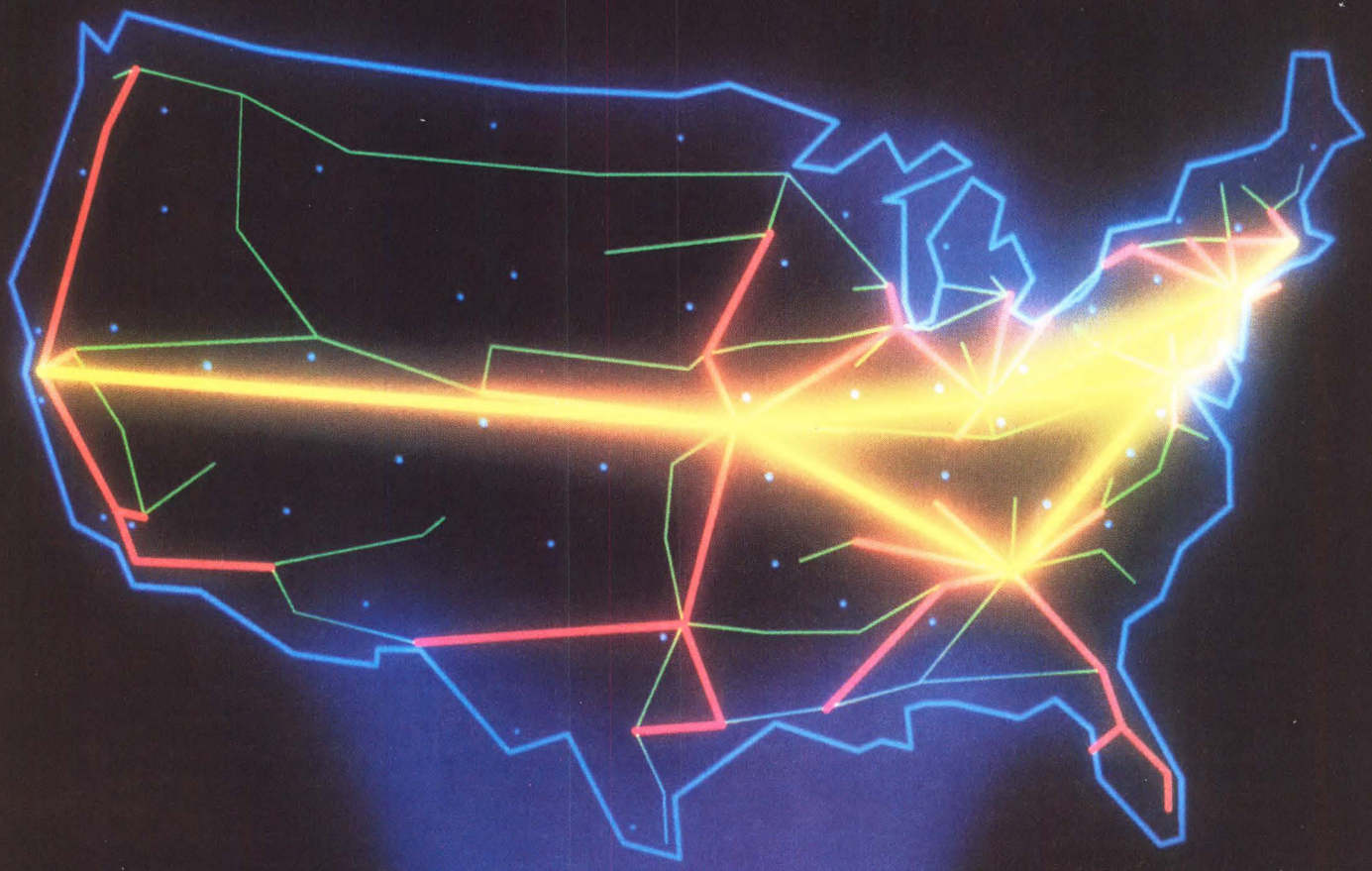


Photo by Robert Foothorap/Black Star

Bank of America got on the track with automation by tying together its worldwide systems via shared standards, says Jay Cook, senior vice president.

No one manages data networks better than Emcom.



When the management of this 1,000 line, 23,000 terminal network wanted more control to build a more responsive and *reliable* network, they turned to Emcom Corporation and the NCS/7020 Network Control System.

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CIRCLE 13

opment with IBM, American became a key force in the development of industry-wide processing and programming standards. A PL/1-like language, called Sabre Talk, is an American creation. And Snap, an abbreviation for Sabre Network of Attached Processors, is a method of tying together large computers for more effiient processing. At American's main processing center in Tulsa, OK, four IBM 9083 mainframes (3083 mainframes specially modified for the heavier input/output load needed by airlines) are "snapped" together to support the reservations network. Another 9083 waits in backup. Supporting 65,000 Raytheon PTS-100 and Icot 57, 260, 767, and 757 terminals, the network hit a peak load of 950 messages a second one day last April.

American uses the mainstream Systems Network Architecture (SNA) from IBM for some of its commercial networks—accounting and its frequent-flier program, for example. Sabre, however, takes advantage of Synchronous Link Control/Asynchronous Link Control, a 6-bit protocol developed by the airlines with IBM in the mid-1970s. "SNA in its early evolution had many qualities that made us uncomfortable," says Marston, citing its sluggish message-handling capabilities. The backbone network uses leased lines from AT&T Communications, Morristown, NJ, at speeds of up to 56,000 bits per second. In addition, a satellite link connects American's domestic network with a 275-worker "data-entry shop" on the Carribbean island of Barbados that generates marketing and accounting reports.

The splintering of the Bell System left American Airlines with a backlog of 1,500 uninstalled private lines. When opening service to new airports recently in Santa Barbara, CA, and Islip, NY, the airline had to resort temporarily to dialup lines. To expedite deliveries, Marston recently ordered the air carrier's first data circuits from Washington-based MCI Communications, a big AT&T competitor.

Staff shortages have also been a problem for Marston, who oversees 2,000 employees. "Talent's going to be scarce for a while as the banks get into the business," Marston says. Are these shortages related to American's reputation as a hard-nosed wage negotiator? After all, American is notorious for its "two-tier" wage agreement that pays new employees in unions covering pilots, flight attendants, mechanics, and ground crews as little as half of what current employees earn. Marston thinks not. "We pay market rates," Marston says of his staff's compensation. On the programming side, Marston has dealt with staffing problems by taking recent college graduates and teaching in-house classes in the PL/1 and the Airline Control Program, an airline-industry operating system.

American has plans for a $27 million private packet-switched network that Marston hopes will satisfy the airline's continuing demand for increased capacity. American has contracted for front-end processors with Christian-Rvosing, a Danish manufacturer that has been a supplier to NATO and several European governments. Christian-Rvosing, Marston says, met American's specifications better than did several domestic suppliers. The network's multiplexers and modems will come from Racal-Milgo, Universal Data Systems, and AT&T. American has also undertaken a $22 million renovation of its Tulsa, OK, data center, aimed at protecting it against floods, tornados, and other sundry disasters.

Even with millions spent and millions more in budget, American still wants more. The air carrier is waiting for the release of IBM's high-end mainframe, code-named Sierra. "We walk a very close line between our demand and available capacity." Marston stresses.

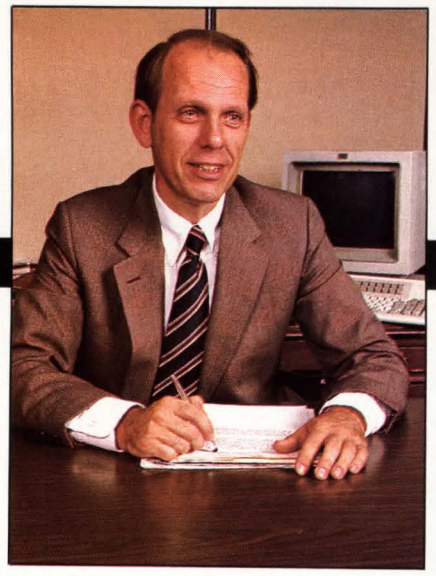
American's aggressive maneuvering in airline automation is just one example of the kind of business strategy that vexes the airline's competitors. American, for instance, has attracted financing from unorthodox sources, such as a loan from the New Zealand government. Even with the CAB ruling restricting the use of reservations displays, American remains undaunted. "It's just another opportunity," Marston remarks.

Day-to-day communications management might be described by the line, "Brother, can you spare a line?"

BROWN & ROOT

The largest deployment of machines and personnel, other than troops in wartime, may occur at the start of a major international construction project—the building of North Sea offshore oil rigs, for example. Short of establishing geographically dispersed communications centers, often an overburdening expense, the contractor must provide centralized teleprocessing services spanning the globe. For Houston-based Brown & Root Inc., payroll and job-cost accounting functions must be supplied to personnel in Norway, Malaysia, and Paducah, KY, among other places. B&R, the construction and engineering subsidiary of Halliburton Corp., employs 40,000 employees, 6,000 of which are based overseas.

How does B&R handle this weighty load? By hook and by crimp. The international contractor for offshore oil rigs and marine pipelines



Aetna Life and Casualty is sweating out the specifics of a bridge between incompatible networks that will have wide importance to other major corporations, says Russ Bowen, director of telecommunications.

uses a satellite hookup and a crimp of twisted pair wiring or coaxial cable. "We probably have communications to 30 different job sites in the United States," says Doug King, B&R's general manager for computer services. Moreover, the construction and engineering giant has satellite and leased lines that transmit data at 9,600 bits per second (or 9.6 Kbps) to Singapore, London, Bahrain, and Venezuela.

Despite the flood of technical papers and trade articles on data-communicatons planning, B&R took an incremental approach. "There was no formal, written plan," says King. Nevertheless, B&R adequately manages regular payrolls, printing checks in Europe, Latin America, and the Middle and Far East. Data lines are also used to transmit proprietary engineering design programs and maintain other administrative functions. "A user in Stavenger, Norway can go into the terminal room and access the computers in either London or Houston," King says.

Centralization of communications and processing operations in B&R's Houston headquarters suggests the need for extensive backup facilities. The data center has an extra communications controller and is equipped with halon gas, a sprinkler system, and backup power sources from Emerson Electric, Santa Ana, CA, and International Power Machines, Mesquite, TX. King acknowledges that these items don't form the basis of a textbook redundancy system. Cost is a constraint, however. "If we had an explosion in this building, we'd be out of business," he says. "To have truly good backup you'd have to have a duplicate system. We just think the cost for that kind of backup isn't justified."

When B&R needs to survey network performance, it uses Racal-Milgo's Communications Management System. The system, which uses a PDP-11/23 minicomputer from Digital Equipment Corp. (DEC), Maynard, MA, as a control device, monitors line performance and triggers an alarm if the bit-error rate falls below a specified level. By gauging when line traffic is low, network managers can use open lines for voice communications.

B&R has taken some of the load off its Houston data center by distributing processing power to its London office. There, four DEC VAX-11/780 minis process most of the load for B&R's North Sea operations. Because of Houston's smaller processing needs, a Houston-to-London satellite link has been dismantled. "We won't have as great a need for the satellite's 56 Kbps transmission speed because of the distributed-processing setup in London," says King. Instead, three 9.6-Kbps leased lines are being installed between Houston and London. Employing Racal-Milgo modems, the transmission speeds will be upgraded to 14.4 Kbps. The changeover was delayed for more than three months while AT&T Communications finished installing the lines.

In furnishing overseas links, the Houston-based telecommunications staff must negotiate the sometimes exasperating idiosyncracies of foreign communications vendors. The task isn't always difficult. Contracts with Singapore Telecommunications and Cable and Wireless (Bahrain) proceeded without incident. However, other communications hookups were maddening. The reasons were more often political than technical, recalls King. Libya and Venezuela are two examples.

When Lee LeMaire was hired five years ago as data-communications manager, B&R was trying to establish a satellite connection to Tripoli, the Libyan capital, for a mammoth irrigation project. As of August, B&R was still trying to make that connection. Promised approval from the Libyan government never materialized. "We had some Libyan ministry officials in Houston who said they'd take care of approval," recalls LeMaire. "But they never did." Asked why, LeMaire alludes to the stormy relations between the American and Libyan governments: "I suspect that the reason is that the satellite earth station is near Washington." An attempt to route transmissions on a terrestrial link from Houston to London, then via satellite to Tripoli, also failed. LeMaire's pessimism was further fanned by the cutoff of diplomatic relations between Libya and Great Britain earlier this year.

Venezuela, where B&R is managing a refinery and marine-pipeline project, produced another headache. Because of signal fading on a connection from Caracas to the job sites, LeMaire tried to reroute transmissions to an alternative microwave system. The state-owned telecomunications supplier flatly refused B&R's request, saying Venezuelan law prohibits the use of third-party hookups.

Despite his irritation, LeMaire, a veteran of several overseas ventures, knew that rules that might apply in Houston would be worthless in Caracas.

The network's global span means that B&R must sometimes acknowledge that certain international connections may prove impossible. For example, the contractor briefly considered leasing lines from Singapore to an oil-rig-fabrication operation in Indonesia. The plan was scrapped.

(Continued on page 42)

The Cathedral of Learning at the University of Pittsburgh.

PRESENTING THE LATEST ADVANCES IN ARCHITECTURAL DESIGN.

Rising above the main campus at the University of Pittsburgh stands a Gothic tower called the Cathedral of Learning. Its exterior owes much to medieval architecture. Yet within its walls, you'll find another kind of architecture—one that's thoroughly modern. It's called Information Systems Architecture, the design principle governing the new technologies from AT&T Information Systems.

VOICE, VIDEO AND DATA FULLY INTEGRATED IN ONE SYSTEM

The University of Pittsburgh wanted a total solution to their information and communication needs. AT&T could provide it. We offered a system that fully integrates not just voice and data, but video functions as well.

It's all made possible with Information Systems Architecture, the unifying principle designed into every product we make and tying all our systems together. The reasoning behind it can be summed up in three words: communication, distribution and uniformity.

INFORMATION SYSTEMS ARCHITECTURE: THE PRINCIPLE

Communication

Because all AT&T products are communications based, they can communicate efficiently and effectively with each other and also with products made by other manufacturers like those of DEC and Xerox already being used at Pittsburgh.

Besides being great communicators, they're also great translators. So products from different manufacturers that are otherwise incompatible can communicate with each other, using our equipment as a go-between. In this way, Information Systems Architecture protects both your past and future automation investments.

What's more, the system is functionally integrated, so various applications, such as Electronic Document Communication and Message Center, can work together and share information.

Distribution

Besides functional integration, we also provide function distribution. This allows applications to be distributed to whichever system component is most appropriate and cost-effective. Even to components in different locations, miles away from each other.

And all end-users, no matter where they are, or to which component they are hooked up, still have access to all functions in the system.

Uniformity

All our products are designed to be user-friendly, so they're easy to use. But beyond that, we've also made their operation uniform. A person trained in one location on one type of terminal will have no problem operating a different type of terminal located somewhere else. This keeps training costs down and your operation running smoothly.

With communication, distribution and uniformity as our watchwords, Information Systems Architecture guarantees an evolutionary system that can keep up with changing needs and changing technologies. That's why the University of Pittsburgh will always be a campus of the future, no matter what the future may hold.

THE TRADITION OF EXCELLENCE CONTINUES

The University of Pittsburgh, a distinguished academic leader for nearly 200 years, has called upon AT&T's century of communications experience to help them carry on their tradition. They're in good hands. Four thousand designers and engineers formerly at AT&T Bell Laboratories are now working exclusively to develop new business products at Information Systems Laboratories. Information Systems Architecture will give them the framework by which to tie those products into complete business automation systems.

It will provide our sales staff with a planning tool for total automation so that all needs are met, now and in the future.

And, because of our uniform design, the job of the largest, most experienced service staff in the industry will be that much easier.

To find out now how AT&T Information Systems Architecture can put you on the road to total office automation, call 1-800-247-1212, Ext. 198.

WHEN YOU'VE GOT TO BE RIGHT

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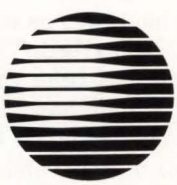


AT&T
Information Systems

BUILDING BIG NETWORKS

(Continued from page 39)
"The cost of a data circuit from Singapore to the job site would have been almost as much as one from Singapore to Houston," says Doug King.

BANK OF AMERICA

As large policyholders and agents demand online access to policy information, Aetna must find a way to make network talk to network.

When it came to electronic banking, Bank of America was once a prude. Three years ago, it had but 80 automatic teller machines (ATMs) for the bank's entire 1,100-branch network. Meanwhile, archrival Citibank, New York, had launched vigorous automation programs. Even other California banks were moving ahead with ATM programs.

A.W. Clausen, Bank of America's president, wasn't a high-tech buff. Then, in 1981, Clausen took over the stewardship of the World Bank and Samuel H. Armacost was named bank president and chief executive officer. Armacost pushed ahead to tie together Bank of America's diverse operations with an electronic web. At the bank's shareholder's meeting in April, Armacost told participants that new technology investments, though a short-term drain on earnings, would be among the factors that "make the difference between success and muddling through."

If the nation's second-largest bank once lagged, its slogan now is "we try harder." Installation of ATMs has proceeded at a "fast and furious"—no less than 300 to 400 per year—pace, says Steve Barnes, vice president for telecommunications. "We've been doing this project very quickly," says Barnes. "The rate of change has been very stressful for the people involved. Our staff has had to work up to 36 straight hours and on weekends to get ATMs installed." The implementation has been complicated by the Bell System breakup, with an average line installation delay of more than two months, and the industry-wide shortage of qualified telecommunications professionals.

Preparation for April's ribbon-cutting ceremony to mark the installation of the bank's thousandth ATM best illustrates the chaotic working atmosphere. "That one almost gave me a heart attack," says Barnes. "There were some very high-ranking executives involved. The ceremony was set up before the installation was complete. It was scheduled for 10 o'clock on Monday morning and the circuit was scheduled for the prior Friday. We had some problems with it and we had to work over the weekend."

Bank of America's belt-tightening program (earnings have declined during the past three fiscal years) has targeted the installation of more than 1,200 ATMs. This is part of a larger strategy to trim total branch numbers from 1,100 to 950 and cut staff by 5,000 employees through attrition. Though lacking in innovation—a far cry from the high-powered networks employed by the airline industry—Bank of America's network has proved functional. When first hired, Wayne Bennington, senior telecommunications consultant, remarked on the bank's somewhat old-fashioned asynchronous protocols and slow-paced 1,200-bps line speeds.

But there are certain advantages to sluggish speeds and established protocols, particularly because the bank has only limited dial backup facilities. "With asynchronous protocols at 1,200 bps on leased lines our failure rate is minimal," says Bennington. Bank of America uses 911 and 930 ATMs from Diebold Inc., Canton, OH, linked to IBM 308X mainframes, IBM 3705 front-end processors, and 90/30 programmable control units from Bunker Ramo Information Systems, Trumbull, CT. Also, the bank has begun to reconfigure its ATM network to use the more advanced Transaction Processing Facility, the operating system borrowed from the airline industry.

Network automation reaches into other aspects of the bank's operations. Bank of America has instituted what it believes is the largest home-banking project in the nation. More than 16,000 customers connect into the service using Tymshare's Tymnet network to transfer funds, make balance inquiries, pay bills, and relay messages to the bank. In another division, a foreign-exchange-trading system deploying IBM Personal Computers on a local-area network from Nestar Systems Inc., is claimed to have dramatically increased the ability of individual traders to process transactions.

One of the bank's largest undertakings is the tying together of its worldwide operations through a shared set of hardware and software standards. This effort—somewhat presumptuously called the International Banking System (IBS)—will create standardized IMS (IBM's Information Management System) databases for Bank of America's wholesale-banking division. More than five million lines of code went into the project. "The overall programming effort is something IBM told us very few companies have tried—it's very near the top of the line in size," says Jay Cook, the senior vice president who heads the bank's global-systems division.

IBS, and the corresponding network upgrade, called Global Data Network, will give the bank true system-wide integration. By 1988, a bank customer in Singapore equipped with an IBM PC XT will be able to

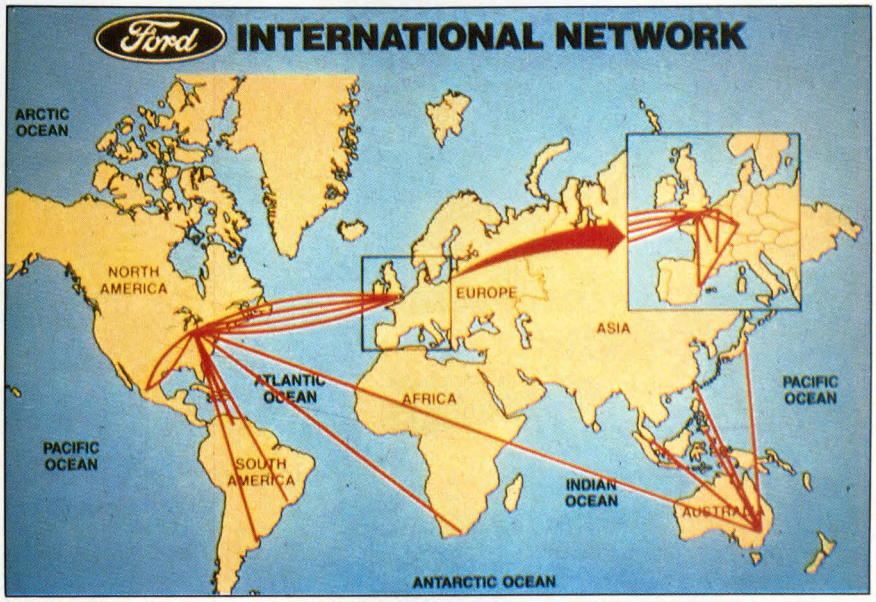
draw down funds automatically for the purchase of American goods, says Cook. "The customer will be able to key in the payment amount and specify the supplier," he explains. "Everything will be done automatically." Besides receiving almost immediate confirmation, the customer won't have to fill out lengthy forms. Reduced clerical processing will also translate into diminished staffing needs.

IBS will be coupled to Bank of America's packet-switched network. Each of the bank's regional centers—including Miami (for Latin America), Hong Kong, San Francisco, and Singapore—will house at least two IBM 30XX host mainframes. DEC VAX-11/750s will serve as front-end processors and statistical multiplexers from Timeplex, Infotron and other vendors will be added. Local telecommunications suppliers—Cable & Wireless in Hong Kong, for example—will furnish the network's backbone.

With the coding finished, logistical headaches—namely, the peculiarities of the local PTTs—remain.

The international-banking project is proceeding despite Bank of America's billions in suspect loans to Latin American countries and a climate in which major money-center banks have started to shy away from new international lending and borrowing.

Why not retrench? Because the pressure is on. Some of the bank's principal New York-based competitors—Citibank, Manufacturers Hanover Trust Co., and Bankers Trust Company, among others—have also begun to network international operations. Citibank's Cosmos and Manufacturers Hanover's Geonet accomplish much the same functions as Bank of America's system. Geonet, a packet-switching network for Manufacturers Hanover's wholesale-banking division, was implemented as early as 1979. Moreover, Bankers Trust has implemented a private packet-switched network for data communications with major switching centers in New York an Hong Kong. Shirking its international-banking plans could once again give Bank of America the status of an also-ran.



Ford Motor Co.'s outline for a worldwide network tying headquarters in Dearborn, MI, to operations in Latin America, Europe, the Far East, and Australia. It's scheduled for implementation after 1988.

ASSOC. DRY GOODS

The existence of a data-communications network in a multidivisional corporation often represents a decision to make corporate headquarters the central hub for data-processing decision-making, sometimes to the exasperation of the divisional dp shops.

Take the example of Associated Dry Goods Corp., New York. During the late 1970s, Associated Dry Goods, currently the nation's 13th largest nonfood retailer, witnessed a spread of systems and software in its operating divisions. Each division had its own dp operation, though smaller subsidiaries relied on processing facilities furnished by their larger corporate siblings. From corporate headquarters on Manhattan's Fifth Avenue, Associated's upper managers saw the need to reform.

Like many retailers at the time, Associated Dry Goods had experienced significant growth in demand for dp support staff because of a duplication in systems costs. Separate dp operations, for instance, each must have a license to use the same software. After assessing these factors, it was proposed that data processing be consolidated into three data centers, each linked to corporate headquarters.

The early stages of implementation were clouded by what was happening to Cincinnati-based Federated Department Stores, a competitor that runs Bloomingdale's and Gold Circle among other operations. Federated's management had conceded that a similar plan for establishing a chain-to-headquarters network had failed, prompting the retailer to institute a plan that successfully decentralized data-processing operations on a division-by-division basis.

The loss of divisional dp autonomy at Associated stirred strong emotions at the divisional level. "It was a cor-

(Continued on page 46)

Toward Clearer Communications:

InteCom discus

ses voice/data integration.

The manufacturer of the first integrated voice/data switching system considers the issues.

Data is a major factor in office communications today. It's projected that within the next five years, data transmission will increase from the present 2% to 40% of total PBX traffic. That's explosive growth. And it means that companies must accommodate this increase by expanding their present systems or by planning now to replace obsolete systems with ones that can meet those needs.

A look at alternatives.

To keep pace with this change, an organization has two basic choices. First, it can stay with a limited voice-only PBX and create separate data networks. This, however, is a costly, inefficient method, and it becomes increasingly difficult to manage multiple expanding systems.

The second alternative is an integrated voice/data system. By installing one network, a company can have voice and data capabilities at every outlet.

Key benefits are the sharing of resources—devices and software—and consolidated network management. An integrated system is an investment in the future that can pay for itself in the savings of single network administration.

A definition of terms.

Integrated voice/data is sometimes thought of as simply combining voice and data in one switch. But it's really much more. It's the total integration of voice and data through a twisted pair network.

Because a digital system does not distinguish between voice and data, both look the same as they pass through the switch. So it's possible to apply sophisticated voice features to data—least cost routing, conference calls between workstations, callbacks on data terminals and other aids to productivity that are normally associated with voice-only systems.

Major considerations.

Universal Connectivity

One of the greatest challenges facing communications professionals today is the management of changing technology. In an environment where many approaches to office communications call for complete flexibility, only a system designed to be compatible with multi-vendor equipment is a safe choice. Such a system provides the format and protocol conversion capabilities for dissimilar devices to communicate with each other, freeing a company from the need to choose all its equipment from one vendor.

A system should be capable of connecting numerous dissimilar devices to a common network, allowing them to share peripherals, data and functions. This flexibile connectivity also protects your investment in equipment, ensuring its continuing value.

Non-Blocking Traffic

In voice systems, many calls can share one path through the switch because conversations are short and not everyone uses his telephone at the same time. However in data communications each device needs full access through the switch, and the long holding times of data calls place heavy demands on a network. As more data circuits are added to meet growing user needs, a system founded on voice-only design can't handle the traffic and begins to block calls from completion, or to degrade the quality of transmission.

Non-blocking matrix architecture, however, places no restrictions on voice and data access. As the data-to-voice proportions change, the system is reconfigured at the host controller. And there's no new cabling required. In non-blocking systems, savings are soon realized in simplified administration.

Processing Capacity and Speed

Many installed systems operate on 16-bit processors. While this may be adequate power for today's voice-only systems with few data options, it may not be sufficient for tomorrow.

Since a system's processors are the limiting factor, they must offer enough capacity for growth. A system offering 32-bit processors can handle both present and future capacity requirements. It's valuable insurance against obsolescence, with unlimited potential for applications like video and future developments.

The office automation industry is introducing more and more devices that operate at speeds up to 10 Mbps. Only an integrated voice/data system that offers 10 Mbps connectivity and integrated local area networking can successfully carry a company into the automated office environment now evolving.

A view for the future.

In 1979 InteCom introduced the first integrated voice/data system, the IBX™ Integrated Business Exchange, and since then has been setting the pace for the office communications industry.

The system has been proving its merits in installations all across the country for more than three years. It's backed by comprehensive support and refined through an ongoing program of research and development. Software-oriented, adaptive to new technology and protected from obsolescence, the IBX offers you the connectivity needed for tomorrow's automated office.

We hope this look at the issues of voice/data integration will be useful to you in your system selection. InteCom has met the communications requirements of companies in a wide range of industries. And today, our representatives are ready to help you evaluate your specialized needs.

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CIRCLE 14

BUILDING BIG NETWORKS

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porate decision; I'm not sure the stores were very happy with it," says Brendan O Connor, director of corporate-computer services. Proposals for systems now have to be submitted to a steering committee, with divisional as well as corporate representation. The additional layer of bureaucracy can tax the divisional dp managers.

A discussion of sales-report formats might bog down over whether sales should be reported on a gross or net basis. Several divisions expressed their desire to once again be given control over dp, requests that were denied by William P. Arnold, who was chairman at the time.

Despite these early difficulties, Associated's dp overhead is lower than if each division had attempted to automate independently. The network is run from two data centers, one in Culver City, CA, a second in Piscataway, NJ. (The divestiture and consolidation of three divisions led to the closing of the St. Louis data center.)

The host systems at the data centers consists of IBM 3083 mainframes with IBM 3705 communications controllers. These are connected to IBM 4331 mainframes for distributed processing at flagship stores. Data are transmitted between California and the corporation's New York headquarters via a satellite link supplied by RCA American Communications.

Implementation sometimes proceeded in fits and starts. "It was very difficult finding adequate technical expertise," says O Connor. "And the vendors weren't much help." The IBM 3760 terminals couldn't transmit at 9.6 Kbps required for data entry. "The architecture (IBM's SNA/SDLC) design says you should be able to go at 9.6 Kbps," says O Connor. "It turned out that the IBM 3760 can only go up to 4.8." It became necessary to multiplex 4.8-Kbps lines at an additional expense, something we had to figure out on our own."

An Associated-owned California chain, J.W. Robinson, experienced perhaps the most profound changes. An IBM point-of-sale system has replaced older terminals. Integration has meant that a branch manager equipped with SNA-configured IBM terminals can communicate with the flagship store, the data center, even corporate headquarters in New York.

Looking to the future, Associated is seeking at least a partial liberation from the injustices of the local loop. Currently, private-line connection to its Piscataway data center requires the care and feeding of three suppliers: Nynex, the Bell regional operating company, AT&T, and New Jersey Bell, the local Bell operating company, according to Parviz Hatami, manager of communications and technology services. Like the rest of the post-divestiture world, Associated Dry Goods must wait—sometimes up to three months—for line installations.

AETNA LIFE

Recognition of the importance of tele- and data communications to corporate survival has helped produce healthy revenues for the ubiquitous consultants as well as hotels and convention halls servicing conferences on the subject. However, insurance is one industry that has little need to attend these sessions. In fact, the big insurance carriers can serve as a source of seminar speakers.

Network management for insurance carriers assumes a more mature role than it does for other industries. (See "Ivans to the rescue," which accompanies this article") The reason: The insurance industry boasts some of the oldest data-comm facilities. For Aetna Life & Casualty, Hartford, CT, one of the largest property-casualty insurers, the problem of making computers talk to one another was first addressed 20 years ago. Now, as large policyholders and agents demand online access to policy information, Aetna must find a way to make *network talk to network.*

Aetna maintains 11 networks (in-house corporate, agent-broker, claims, Medicare, and others). Roughly three-quarters use IBM's SNA/SDLC protocols, the remaining three make use of bisynchronous protocols. For example, Aetna's 5,000-terminal claims network still uses bisync. Under the carrier's network-integration plan, the bisync networks will be converted to IBM's SNA. Exactly how the project will be implemented is still a question, says Russ Bowen, Aetna's director of telecommunications. Aetna is considering Accunet T-1.5 Service, AT&T's high-capacity (1.5 Mbps) digital service. Accunet could serve as a trunk line carrying all network traffic to major office sites, where tail circuits of narrower bandwidth could be split off for the individual networks. Currently, Aetna leases point-to-point lines for all 11 networks. "Anyway you look at it, this will mean a reduction in line costs, an improvement in maintenance, and the ability to route all circuits going to one place," says Bowen.

The marketing of T-1 service is viewed as a major breakthrough by many corporate users. The ability of a T-1 circuit to channel simultaneous voice, data, facsimile, and video signals helped prompt Aetna's reevaluation of telecommunications services. Aetna currently uses Satellite Business Systems, which is 40 percent owned by the carrier (IBM owns the rest), for most of its long-distance voice transmissions. If lower costs can

When it came to electronic banking, Bank of America was a prude.

be had, however, those signals might be channelled onto a T-1 network, Bowen says.

While planning the project, Aetna obtained private land and railroad rights-of-way for routing the cabling needed for a bypass system. In the end, however, Aetna stuck with Southern New England Telephone, the local telephone company. Southern New England Telephone was only 24 percent owned by AT&T at the time of divestiture and wasn't encumbered by the same entanglements as the AT&T-owned operating companies. Says Bowen: "The phone company recognized there was a strong chance that we'd install it ourselves. They came to us and said, 'Let's see what kind of deal we can work out.'"

American Airlines may be the world's second-largest air carrier, but its Sabre automation system is Number 1 among travel agents.

IRS

Last spring, much publicity was given to an automated dunning system the Internal Revenue Service had established to track down delinquent taxpayers. The $115 million package was implemented with IBM 4341 computers, automatic-calling devices from Rockwell International, Pittsburgh; custom software from Arthur Andersen, Chicago, and systems integration work by GC Services Corp., Houston. The system lets IRS sites nationwide dial the numbers of delinquent taxpayers. If there's no response, the call is rescheduled for a later date. As many as 2,200 calls per week are made from the individual centers. It's estimated that efficiencies achieved with the system, designed after studying private collection agencies, will bring in as much as $500 million in additional revenues this year.

However, corporate treasurers needn't worry about transferring their cash-management programs to a Geneva, Switzerland savings and loan association. The IRS still suffers from electronic myopia. The core of the IRS dp system is state of the art circa 1962 and a bigger technological fix is needed to help with the annual $81.5 billion gap between revenues collected and the amount owed.

Change is uppermost in the mind of Donald E. Curtis, the agency's acting assistant commissioner of computer services. Receiving nearly one billion documents annually, the agency recognizes the need to upgrade. Curtis says the agency would like to give taxpayers the ability to file returns via terminal or personal computer. And the agency wants to apply artificial-intelligence techniques to audits. But these projects remain elusive, awaiting Congressional approval and a lengthy bidding process. Curtis says the project won't reach completion before the 1990s.

Under the present system, agency workers edit, code, and enter tax returns and other documents into mainframes from three vendors—Sperry Corp., Blue Bell, PA (Model 1180), Control Data Corp., Minneapolis (Model 3500), and Honeywell Inc., Minneapolis (Model 2050)—at regional centers. From there, taxpayer data must be moved to the National Computer Center for account posting and settlement in Martinsburg, VA. Although an ideal candidate for a network, the IRS system still requires that tapes be moved by air freight to the national center. "Again, that's the system that was set up in 1962," says Curtis.

The IRS regional centers do have some networking ability. Subsets of the master files at the national center can be downloaded, using a tape-transport system from Mitron Systems Inc., Columbia, MD, to check taxpayer accounts.

The agency's inability to establish full networking capabilities has even stunted the effectiveness of the much-vaunted automatic-calling system. A dunning agent, in the midst of a telephone call, must often go to another computer to retrieve taxpayer information.

FORD MOTOR CO.

The push for a greater share of world markets led Ford Motor Co. to develop a "world car"—a vehicle featuring standardized parts designed and assembled in Ford facil-

(Continued on page 50)

RACAL-MILGO SOLVES THE PROBLEM OF THE OFF-AGAIN, ON-AGAIN LOCAL AREA NETWORK.

Once you've installed your LAN, the problem is keeping it on-line. That's no problem with Racal-Milgo's Planet™ because it's designed to be "failsafe." Planet detects trouble, bypasses it and restores your LAN communications automatically – within seconds. Malfunctioning terminals, connection trouble spots, even a broken cable won't interrupt your communications. Not all local area networks heal themselves, but that's only part of the Planet story:

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Racal-Milgo has developed a Director unit with a special self-checking circuit that constantly monitors system performance. When it detects trouble, it closes the loop around the problem, enabling your LAN to remain on-line. The Director also sets up calls, switches and re-configures the system, and collects statistics on calls and network performance.

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Planet lets you mix protocols, simultaneously. With Planet connectors installed in a building or building complex, you can simply plug in your terminals, printers and other DP equipment wherever you want. Planet can accommodate 500 devices and operate effectively within an 8 mile circumference.

When we say there's not a problem in local area networks we can't solve, we mean it. We've done it for more than 100 other Planet users worldwide.

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Yes. Please send me a copy of your Local Area Network Problem Analysis Form.

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INDIVIDUAL:_____

ADDRESS:_____

CITY/STATE:_____ ZIP:_____

PHONE:_____

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CIRCLE 15

BUILDING BIG NETWORKS

(Continued from page 47)

ities worldwide. Implicit is also the threat of moving production overseas, part of the bargaining strategies employed by both Ford and General Motors during recent negotiations with the United Auto Workers.

Ford concluded that it had to revamp its telecommunications infrastructure, which is based on point-to-point leased lines. The current network is grossly inadequate for the transfer of massive quantities of computer-aided design and manufacturing (CAD/CAM) data and supplier information necessary for worldwide design and manufacturing operations. As a result, Philip Caldwell, Ford chairman, issued a 1982 directive calling for central control of the auto maker's telecommunications worldwide.

Responsibility for the implementation of a global communications network went to Ford's telecommunications services team at the manufacturer's Dearborn, MI, headquarters. "Before 1982, each overseas affiliate had full control over its own connections; there were no standards," says Jim Soma, manager of telecommunications services. "Now we have to put in procedures to give overseas locations the ability to tie into a worldwide network."

Nothing is yet on paper—planning, budgeting, and implementation will continue through the end of 1988. But the network will most likely comprise a packet-switched network, employing X.25 protocols, with major switching nodes in England, Australia, and the Dearborn headquarters. Later, Brazil and Japan will be added.

The international network will connect to a domestic counterpart. Ford considered using Net 1000, AT&T's data-communications network, as a means of hooking auto dealers into a parts-inventory network. Recently, however, tests of Net 1000 were abandoned, reportedly because Ford needed a wider network. (Ford declined to reveal its reasons for dropping Net 1000.) The auto maker is also evaluating GTE Telenet and Tymnet.

The beginnings of an overall network were put in place in November 1981 when Ford replaced its private-wire teletype network with an

IVANS BATTLES THE GIANTS

The concept of industry-wide data network services has been around for decades. In the 1960s, for example, the airlines debated the development of a universal network linking carriers and travel agents. Though that idea never got off the ground, a group of insurance carriers have undertaken a similar project to fight back against industry giants.

In January 1983, Insurance Value Added Network Services (Ivans) began as an agency to manage a data-communications network that links property and casualty insurance carriers and independent agents. The need for a network was evident from the spread of largely incompatible equipment in agents' offices and the inability of these small systems to communicate with the many carriers each agent might represent.

Ivans is, in fact, a value-added network on a value-added network. It makes use of the IBM Information Network, another value-added network. The 28 subscribing carriers use Ivans to hook into the IBM network with widely used protocols. Ivans' major applications include message transfers between agencies and carriers, batch and interactive services, store-and-forward capabilities, and message routing to many destinations.

After becoming an Ivans member, an insurance carrier is responsible for establishing an interface with the network and paying certain network-usage fees, as well as Ivans' administrative expenses until the network is self-sustaining. Ivans' costs during 1983 were roughly $730,000.

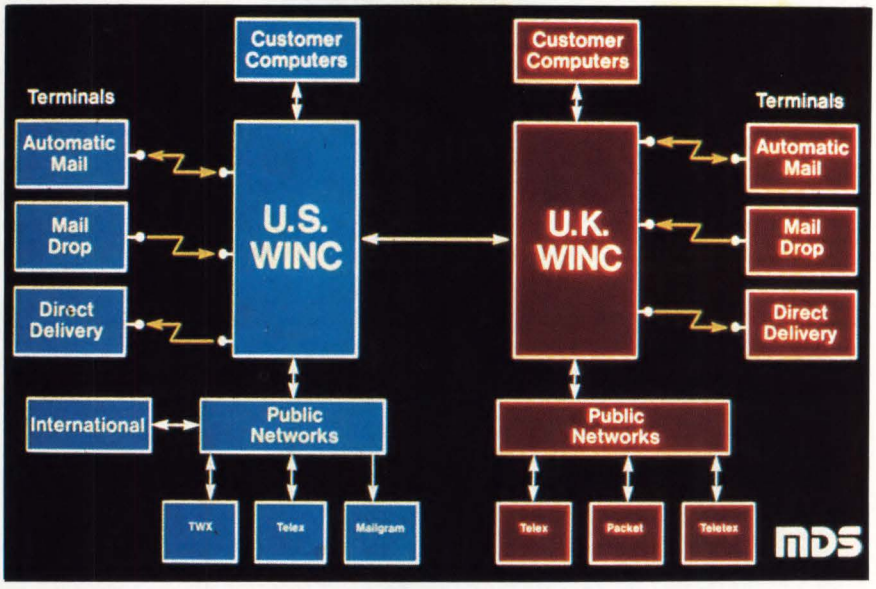
Although Ivans includes some of the nation's largest insurers—Cigna and St. Paul Fire and Marine Insurance, for example—there are also some notable exceptions: Aetna Life and Casualty, The Travelers Insurance Cos., and The Hartford Insurance Group. Many of the larger insurers maintain their own carrier-agent networks. However, Rita Waters, Ivans' director of customer relations, acknowledges that some of the nation's more than 500 insurers won't sign up until Ivans develops a larger agent base. Only about 400 of the more than 6,000 automated agents subscribe to Ivans.

Aetna evaluated Ivans about 18 months go. At that time, the carrier decided that the number of agents on the network was too small and that it was still more economical to use its own networking facilities, says Russ Bowen, director of telecommunications. Aetna currently uses AT&T's Wide-area Telephone Service (WATS) to communicate with about 350 independent agents. Aetna also markets to agents Gemini, a stand-alone data-processing system based on IBM's Series/1 minicomputer. While only a small number of independent agents have computers—between 6,000 and 12,000 out of 60,000 nationwide—Rita Waters believes the the pace of automation has quickened with the widespread availability of microcomputers. That may mean more subscribers to Ivans in particular, and easier availability of information to agents and policyholders in general, she says.

electronic-mail service, Worldwide Integrated Communications from Mohawk Data Sciences Corp., Parsippany, NJ. This enabled the manufacturer to transmit messages, including memos, schedules, reports, and other business documents, to factory and corporate sites worldwide. Transmission speeds reach up to 2,400 bps, a significant improvement over the sub-100-bps rate for teletype. Ford estimates an annual savings of $20,000 in equipment and services costs.

Another link was was established in December 1983 when Ford began leasing satellite services from Satellite Business Systems for voice traffic that was previously routed over leased and Wide-area Telephone Service (WATS) lines. Projected savings: $2 million by next year. The auto maker also plans to use its own Intelsat satellites for communications to Europe and Mexico (Ford Aerospace & Communications Corp. manufactures Intelsat V). Later next year, an Intelsat satellite will also transmit production scheduling information from Dearborn to Hermosillo, Mexico, where more than 100,000 cars are scheduled to be assembled annually for export to the United States. Another Ford subsidiary, the recently purchased Starnet Corp., may help supply Ford's domestic data and telecommunications needs.

On a smaller scale, a private packet-switched network is already in place for the transmission of CAD/CAM data between 20 sites in southeast Michigan, says Gerald H. Peterson, manager of worldwide systems and development. The ring network, which uses GTE Telenet as a carrier, obviates the need to carry tapes the five miles between Ford's Body and Chassis Engineering division and the Body and Assembly division.



Ford began building its global net by installing Worldwide Integrated Communications, an electronic-mail service from Mohawk Data Sciences. Transmitting administrative messages are the beginning; transmissions of automated-factory data will follow.

Prime 750 minicomputers with Model 450 and Model 2250 network controllers, also from Prime Computer Inc., Natick, MA, constitute the host system. The design databases are accessed with more than 100 Lundy-Hypergraf graphics terminals from Lundy Electronics and Systems Inc., Glen Head, NY. Eight to 12 part files, ranging from 100 to 250 kilobytes apiece, are transmitted daily at 19.2 Kbps. "Before we had this system, it usually ended up taking 24 hours and often quite a bit longer to haul the numerical-control tape over to the stamping plant and run it into the system," says Duane Lawton, numerical-control and systems specialist. "This is head, shoulders, and other anatomical parts above what we had before."

Ford has also upgraded its 10-year-old communications network—Solmis (Supplier Online Management Information System)—adding new ports and lines to accommodate smaller suppliers who have begun to access the network via microcomputer. Before the advent of microcomputers, about 80 percent of the auto maker's roughly 1,000 suppliers could access the dialup network that forwards information about materials requirements, order quantities, and shipment size. Now, virtually every supplier can afford to log on. At Ford's end of Solmis stands a Burroughs 6800 mainframe with more than 100 asynchronous terminals from various vendors.

Although Ford is extending its global reach, it eschews bypass. Jim Soma believes bypass is a moot question: The local phone companies are here stay. "There's a lot more plánning going on than straightforward *coping* with the relationships between service suppliers and service buyers," he says. "Installing bypass is like installing a computer for the first time." □

"We have communications to 30 different job sites in the U.S."

—King, Brown & Root

GO-ANYWHERE TERMINALS

Photo by Rick Barrick

MAKING THE OFFICE PORTABLE

Unlike portable computers, portable terminals are rugged, affordable, and, in some cases, small enough to be delivered by Federal Express.

by Miriam Lacob

Tapping into computer power when you're away from home base used to be a heavyweight problem. Now, the load has lightened considerably. Executives in the field or managers setting up remote communications can choose from a multitude of rugged portable terminals, some weighing less than 2 pounds.

Advances in microprocessor technology have resulted in an explosion of innovative products that are a far cry from the bulky, 30-pound-plus workhorses that passed for portable terminals just a few years ago. A truly portable terminal should fit into a briefcase, with room left over.

"We were stretching a point when we put a handle on a terminal and called it portable," says Texas Instruments spokesman Ted Jernigan of the manufacturer's pioneering forays into portable terminals. (Texas Instruments' first thermal-printing portable, weighing 38 pounds, was introduced in 1968.) The manufacturer's latest product, the Model 707 Silent 700, weighs 6 pounds and fits into half a briefcase. The 707 comes with an optional battery pack; travelers do not need a power outlet to access the corporate computer. Like Superman, all a resourceful user needs is the corner telephone booth.

Similarly, experts who predicted a wait of several years for a flat liquid-crystal display (LCD) exceeding two lines of capacity have also been proved wrong. TEC recently announced the Data Pad Portable 84 Display Terminal, which has a flat, 16-line-80-character LCD. The terminal, weighing 3.2 pounds, has a full keyboard but is less than 2 inches thick. With such dimensions, it is so unobtrusive that Hans Daniel, director of product planning, says he often forgets which briefcase he left it in. Terminals with crt displays are hard to ship because airlines require them to be registered as baggage, says Daniel. For this reason, he says, he enjoys "absolute freedom" transporting the Data Pad. "I send demonstration terminals to customers in Federal Express envelopes," he says.

Portable terminals are also breaking barriers in communication speeds—an important consideration for users of expensive online time. Terminals in Computer Transceiver's latest line, the 1200 Series, weigh less than 10 pounds and communicate at 1,200 bits per second (bps). And TEC's Data Pad can transmit data on direct connection at up to 19,200 bps, an unprecedented speed for LCD terminals.

Other users of portables are bypassing telephone hookups altogether. In May, IBM began implementing a two-way digital communications system using Motorola PCX radio terminals. Big Blue's service technicians and field-service engineers are using the 28-ounce, 4,800-bps ter-

GO-ANYWHERE TERMINALS

minals, with 20 Kbytes of random-access memory (RAM), to communicate with home base and with one another. IBM personnel say the system has saved hours of time by ending "telephone tag."

"If I'm working in the field and I get a message from a customer across town, it's likely that I can reply in seconds," says John Cox, a support specialist at IBM's Chicago office. "It's also likely that the customer saved an hour or two in trying to get in touch with me." The IBM system is installed in Chicago and Los Angeles, and will be expanded to Big Blue's 300 service locations nationwide by 1985.

Given their vast potential for all kinds of communications, it's not surprising that portable terminals are used in a wide range of applications. Users range from real-estate agents accessing listings of houses for sale to technicians troubleshooting remote metering units on a natural-gas pipeline hundreds of miles from the nearest town.

Already, Airfone, in a joint venture with Western Union, is taking steps to let executives pick up their electronic mail in flight. The air-to-ground telephone carrier, which was scheduled to launch the service on October 15, plans to install credit card-operated telephones in most planes. Once the telephone service is operational, says Art Spilling, senior director of the special-project engineering group at Western Union, the company plans to provide, via the telephone system, a direct connection between an executive's terminal and his or her earth-bound computer system.

A major application of portable terminals is order entry and message retrieval for field sales. Here the terminals are also used to access central databases and pull up numbers and projections that can help clinch a sale.

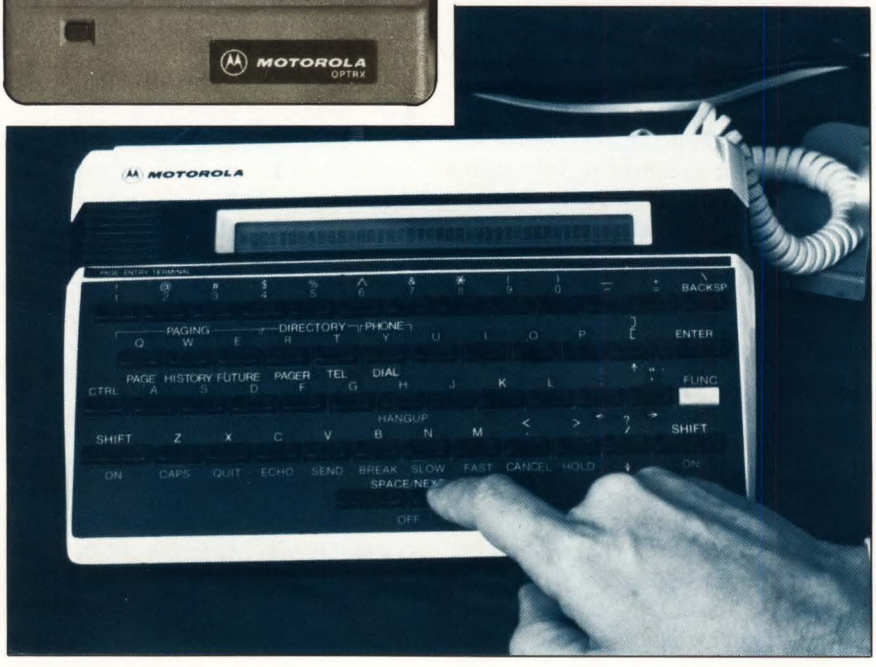
For example, sales reps for Valmont Industries, a Valley, NE, irrigation-piping manufacturer, are using their Texas Instruments Silent 745s to access 30 proprietary programs in the company's mainframe Val-A-Net system. The sales reps, sitting in a farmer's kitchen, can access programs ranging from design aids to economic analyses of the most cost-effective irrigation systems for the farmer's needs. Each program allows for variables that the salesperson or even the customer can punch in.

Terminal makers are also responding to the spread of information and electronic-mail services, like The Source and the Dow Jones News/Retrieval service. 3M, for example, is marketing the Whisper Reader, which has a 40-character LCD used solely to send and receive messages.

So far, however, sales of these terminals have proved disappointing. When communications-only terminals were first marketed, manufacturers expected business travelers by the hundreds of thousands to place their orders. But the electronic-mail services themselves are not attracting users, as witnessed by the June 5 decision of the Postal Service's Board of Governors to sell its E-Com network because of big losses. The result is big opportunities for users. 3M recently dropped the price of its Whisper Reader by over a third—to $499.

Within the communications and computer industries, however, many large corporations, particularly those that have their own networks, are making full and productive use of electronic-mail systems. IBM, which wrote its own applications programs for the Motorola-manufactured PCX radio-frequency (RF) terminal, uses its system extensively for sending messages. At this past summer's Olympics, for example, the terminals, spread over 2,400 square miles of southern California, kept IBM in touch with service representatives

Motorola's 4-ounce Optrx pager serves as a tiny personal message center for traveling executives. The Page Entry Terminal sends a single message to up to 1,970 Optrx pagers.



supporting its processing systems.

Jay Fitzpatrick, head of Mohawk Data Sciences' Worldwide Integrated Communications Network (WINC), says he has noticed a small increase in the use of portable terminals to access messages. Traveling Ford Motor Co. staffers, he says, use 3M Whisper Writers or Radio Shack TRS-80 Model 100 portable computers to receive and send electronic mail. (Tandy Corp., maker of the Model 100, is scheduled to introduce a 6-pound portable printer for the machine on November 30.) The automaker uses the international WINC network as the hub of a network that handles more than 200,000 electronic messages monthly.

Using a terminal for receiving messages appears to be more common when electronic mail is incorporated with other functions. Branch offices of J.J. Kenny, a nationwide stock brokerage, for example, receive stock and bond quotations on 3M Whisper Writer terminals. And Tupperware, the Florida-based kitchen-products distributor, uses Whisper Writer terminals at 400 locations to transmit pricing and product information to its distributors. The distributors, in turn, use the terminals to enter orders.

Limited-display communications terminals have proved useful in radio paging. Conventional paging methods have been outmoded by new devices that are actually personal message centers. One such device, Motorola's Optrx display pager, can store up to to four 80-character alphanumeric messages. It can be used in conjunction with the Motorola Page Entry Terminal to automatically send the same message to up to 1,970 Optrx pagers, if necessary. The Optrx can also receive stock or commodity prices.

At present, most RF terminals are limited by communications distance and Federal Communications Commission regulations. IBM, for example, had to wait three months for the FCC to allocate frequencies for its Digital Communications System. And Motorola's paging system can only operate over a corridor of communities about 200 miles long.

A bank executive uses Motorola's PCX Radio Data Terminal to make a presentation to a prospective client. The terminal communicates with home base at 4,800 bps.

This may represent a substantial number of users, however. Motorola and AT&T developed an electronic-messaging system for the summer Olympic games, using an interface between Model 5410 AT&T teleprinters and Motorola's Metro 200 paging terminal. The system put officials, judges, security guards, athletes, and coaches spread over 4,500 square miles within paging distance, says Jim Murray, technology director for the Olympics.

With computing power steadily becoming cheaper, lighter, and more portable, some observers predict that portable terminals are going to be replaced by portable computers. They argue that computers have the same communications abilities, with the added capacities of memory and manipulation—important requirements, considering the costs of online time and hotel telephone charges.

Indeed, many users who until recently were using portable printing terminals to tap central-computer databases, are already switching to portable computers. One is Merrill Lynch Futures meteorologist Thad Chupalio, who previously used a Texas Instruments Silent 745 to access weather information from Weather Services International in Bedford, MA. Last July, Merrill Lynch bought Chupalio a Compaq Portable Computer, which he uses to access the weather database to help predict crop production. The meteorologist uses Wordvision word-processing software to compose his reports on crop production, a task he previously did in longhand.

Chupalio now uses his Texas Instruments terminal as a backup machine, and is thinking about turning it into a slave printer. But he still recalls how easy it was to carry his 745 into the office every day. Chupalio says he wouldn't do the same with the 30-pound Compaq "transportable." When traveling, the terminal is still his instrument of choice.

Real portability and ruggedness are offered by few inexpensive portable computers. Few transportable personal computers can be easily jammed under an airline seat or are tough enough to withstand the trials of travel. The housing of the Texas Instruments terminal, says product manager Charles Moon, is built from the same material used to make

GO-ANYWHERE TERMINALS

bullet-proof windshields. Moon, who previously worked for GTE Telenet and used a Silent 700 while on the road, says he recalls dropping his machine several times, with no ill effect.

Meanwhile, KSR 744 terminals from Quint have been taking a beating for the past three years, troubleshooting monitors for a natural-gas pipeline operated by Florida Gas Transmission, Winterpark. The pipeline system, which runs from Florida to south Texas, subjects equipment to conditions of high heat and humidity. Florida Gas' central computer polls the metering units and sends its technicians into the field when the central systems indicate a problem.

Before turning to Quint, company technicians testing line meters had no way of tapping metering data, says Wayne Conrad, district communications engineer. "All we could use before were digital troubleshooting instruments, and all we could see were data coming and going. We used to spend a lot of time scratching our heads and crying."

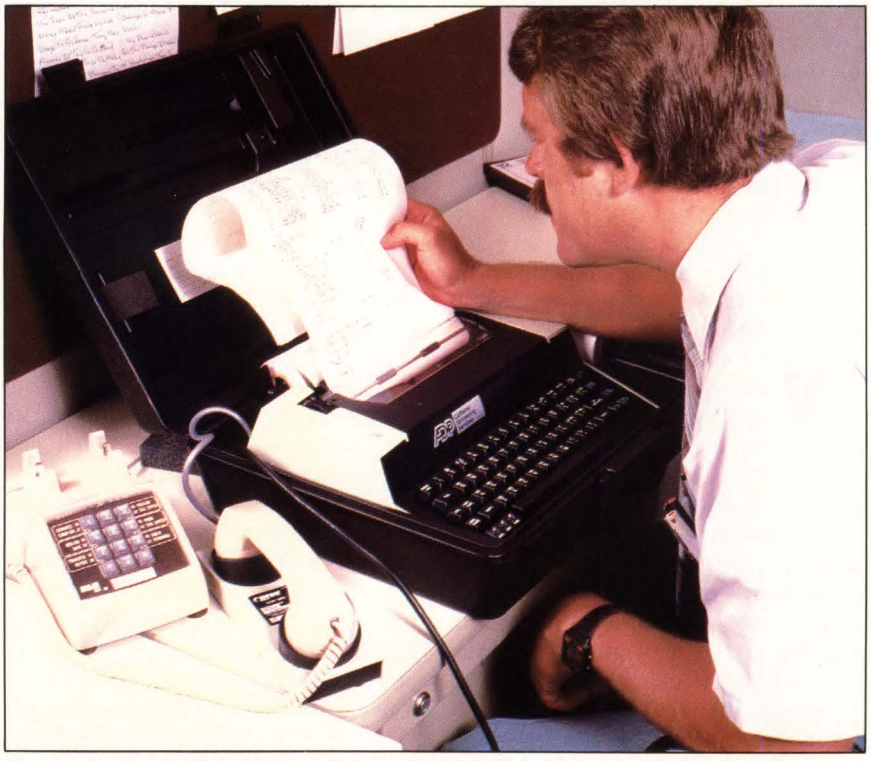
The Quint can print out the metering data, which are transmitted at 1,200 bps. Thus, even though they are "out in the boondocks," says Conrad, technicians can still plug into the meters via an RS-232 port. They can then check the printouts that, based on parameters provided by the carrier's central system, indicate a faulty metering component. In many instances, says Conrad, the technician can make on-the-spot repairs.

Terminal manufacturers, recognizing the need for offline buffer memory to cut phone charges, provide limited capacity in some products. The 3M Whisper Writer, for example, has 8 Kbytes of memory and the polling capability to receive unattended transmissions during low-usage periods. (3M's new Whisper Writer Model 1980 makes it possible to type six to eight pages of material offline.) Texas Instruments also offers a 4-Kbyte RAM cartridge for users of its Silent 700 series.

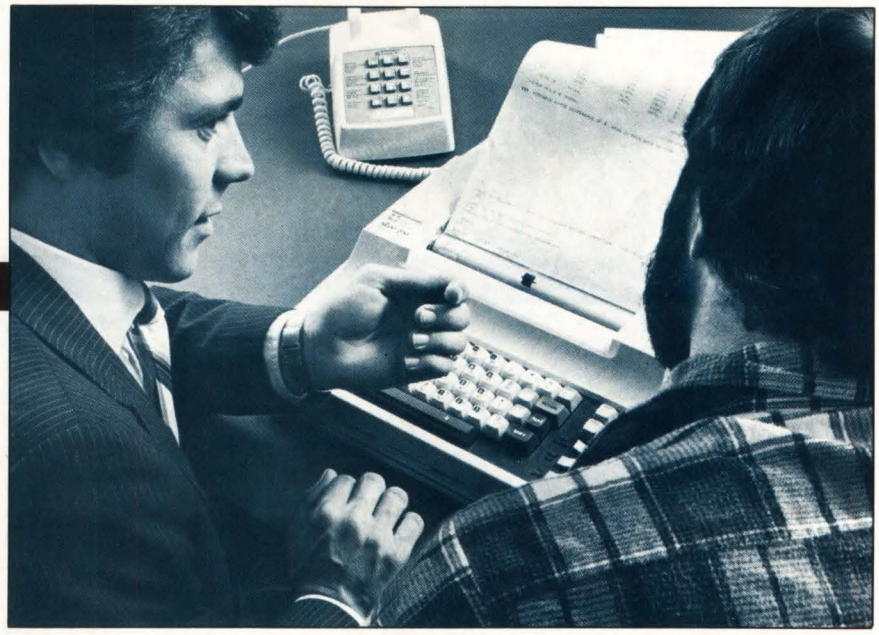
One portable (15-pound) terminal that has considerable offline nonvolatile memory, a 16-line display, and word-processing capabilities is the Teleram Portabubble/81. These features have made it the terminal of choice for *The New York Times* foreign correspondents in such far-flung bureaus as Tokyo and Johannesburg, says Howard Angione, technology editor. (Local *Times* reporters generally use the Radio Shack 100.) "You need significant storage for reporters who are on the road more or less constantly," he says. "The Teleram is an excellent word-processing machine. You don't have to load a program; word processing is virtually built into the hardware. The basic user instructions consist of only 6 inches of copy and 10 minutes of tender loving care."

Even in field sales, the classic domain of portable terminals, some users are switching to portable personal computers. However, although portable computers offer more functionality than do portable terminals, the latter are still way ahead on economics. Prices of lightweight, fully functional portable personal computers range between $2,500 and $4,000. The Hewlett-Packard Nomad, which has 270 Kbytes of low-powered integrated circuit-fabrication memory and 380 Kbytes of built-in read-only memory, lists at $2,995; the Dalmont Magnum, a 16-bit Australian-made micro that weighs in at less than 8 pounds and is being marketed by Teleram Communications, lists at about $2,500. In addition, communications hardware is not always standard in portable and transportable computers, and, in cases where a modem must be purchased, the user can count on spending at least $500 extra.

Another benefit of a portable



Gary Grove of ADP Collision Estimating Services runs a car-repair estimate using a Qwint KSR 745 terminal. Insurance estimators that do not type are equipped with read-only terminals.



Texas Instruments' Silent 707 fits into half a briefcase and can be used, on site, to pull up figures from a central computer to clinch a deal.

terminal is its ability to function in the office as a stand-alone printer or an adjunct printer to a crt terminal. Panasonic, for example, recently began shipping the KX-D4910, a portable printing and communications terminal that weighs 13 pounds in its case and retails for $700. And 3M's Whisper Writer Model 1980 printer can be purchased without the keyboard for receive-only functions. The $750 printer can also be used for low-cost output printing for any crt equipped with an RS-232 interface.

Above all, price is the best selling point of portable terminals. Rick Curtis, assistant sales manager for Equipment Resources, an Atlanta, GA, distributor of computer terminals and hardware, predicts a considerable drop in the price of portable terminals in response to competition from portable computers. "Sales organizations need a terminal or computer for one or two specific functions," he says. "If it serves the needs and costs under $1,000 complete with options, organizations will go for the terminal."

Portable personal computers in the under-$1,000 range are available, but they lack many of the features required for remote operations. Art Spilling of Western Union has been evaluating portable terminals for Airfone. He describes the Radio Shack Model 100 as "a very capable communications device." Nevertheless, it's still strictly an adjunct to a fully configured personal computer, he says. Moreover, the industry has not yet produced a portable and compact personal computer that can print out usable hard copy.

Most portable computers and terminals use thermal printers, chosen for their light weight and quiet operation. However, the cost of the paper, its "feel," and short shelf life are distinct disadvantages. Many users look for portable printers, like the Quint KSR 745, the LA12 from Digital Equipment Corp. (DEC), and the Ecuport 400 Series from Computer Transceiver Systems, that can print on plain paper with multiple copies if necessary.

"You can't print a six-part form with a thermal printer," says AT&T spokesman Ken Kamka. In August, the communications giant began shipping its Model 5310, a 13.3-pound terminal with a 200 character-per-second dot-matrix printer that also produces bit-mapped graphics.

Quint Systems' KSR 745 and RO 745 portable terminals print out repair orders in quadruplicate—as required by the casualty insurance carriers—for ADP Collision's Estimating Services. Bo Rothchild, vice president of data processing for ADP in San Francisco, says the Quints are used by insurance estimators at body shops; they call a toll-free number to connect with a public network like Autonet and run their repair estimate through ADP's tele-estimating nerve center in Ann Arbor, MI. "The adjuster calls and gives the operator the input over the phone. When the estimate is ready to be printed, the operator signals, and the adjuster connects the Quint," Rothchild says. Before switching to this system, he says, adjusters used to wait for days to get repair orders back; now it takes around 10 minutes. The Quint terminal, says Rothchild, includes an optional acoustic coupler. This lets adjusters communicate with home offices from small-town telephone booths that have not yet been equipped with modular jacks.

Another function of portable terminals that is unlikely to be usurped by portable computers—if only because computer horsepower is not required—is the highly specialized work performed by extremely light battery-powered handheld terminals.

Handheld terminals perform a variety of remote data-entry applications, where the user is generally not familiar with computers. The terminals are most commonly used in warehouses and stores, where they can be be strapped onto a worker's wrist, or hung from a belt, to take inventory or check prices. In most cases, a laser-wand attachment reads the barcode of a product. These terminals generally store in nonvolatile memory thousands of characters of information, which are downloaded through telephone lines or direct connection into a central database.

Many manufacturers and retailers are starting to recognize these terminals' potential for reducing errors and cutting labor costs. In one application, a major producer of industrial gases uses Intermec 9420 handheld terminals for inventory, warehousing, and marketing. Executives say they expect the switch to barcoded inventory and delivery systems to facilitate sales because of a more thorough knowledge of stock on hand. These terminals are also rugged; most terminal keyboards are contained under sealed membranes to keep the circuitry safe from

GO-ANYWHERE TERMINALS

hazardous conditions.

In addition to durability, a large memory—136 Kbytes—is why the gas producer chose the Intermec terminal. A program written on an IBM Personal Computer can be downloaded into the terminal to provide readily understandable prompts for the worker in the field.

Apex Trucking of Secaucus, NJ, is using Intermec's 9410 to run a "virtually paperless warehouse," says Bob Cachon, president. The system, says Cachon, eliminates "limbo"—a term commonly used by warehouse workers to describe lost items. It is also helping to cut labor costs. Warehouse workers use a barcode scanner to read the location and arrival time of an item. At the end of the day, the stored information is dumped into a Qantel Model 64 minicomputer. Cachon is so pleased with the system, he's moving up to handheld two-way radio, using Telxon RFX 10 handheld data terminals connected by two-way radio and linked by one base transmitter. He plans to operate this system in two warehouses a half mile apart—and to market his newly found expertise to other warehouses through a new subsidiary, Apex Technology.

CMOS circuitry enables most handheld terminals to handle extremely sophisticated and powerful applications despite their size and weight. Some programmable handheld terminals with large memories can cost more than $4,000 each. However, users are also finding that low-priced terminals deliver the functions they need. Nabob Foods, a Canadian produce broker, uses iXO TC101s to access the Canadian Datapac Information Network. Microprocess, software consultants in Framingham, MA, have installed an automated produce-ordering system for James E. Kilduff, a produce distributor in Everett, MA, using iXO TC200s. Kilduff, in turn, supplied two customers, Roche Brothers and Bread and Circus, with the handheld terminals. The store greengrocers check their shelves, enter their daily orders, and then the $395 iXO 200 automatically enters orders into the distributor's Televideo computer.

Max Factor & Co., the Hollywood, CA-based cosmetics producer, uses MSI/88 data-collection terminals for remote order entry, and has reduced the order cycle by seven to 10 days. Under the old system, sales reps dropped into the mail orders that had to be keypunched by the order department. This often resulted in the carryover of orders into the next day. The manufacturer then tried phone-in orders, a method that proved unacceptable because a typical phone call lasted two hours or more.

"The average portable is not an executive workstation; it's a tool."
—Veatch, Telxon

With the MSI handheld terminals, a Max Factor sales representative simply uses an optical-scanning wand to read a barcoded order form and a selection of quantities. At the end of the day, the MSI terminal is connected to a telephone handset, and, within minutes, the order is transmitted back to the Max Factor data-processing center in Hollywood, CA. In addition to reducing the order cycle, the remote order-entry system saves postage, telephone charges, data entry, and order duplication. Max Factor executives estimate the system will pay for itself in less than two years.

Texas Electric Service Co., Houston, has equipped its meter readers with MSI 88F and 88S terminals. The terminals weigh slightly more than a pound and are powered by penlight batteries. Each meter reader's route is loaded into the unit the night before. Information furnished includes customer data, the previous month's meter reading, and the expected reading for the month. The system can even warn the reader about a dangerous dog in a customer's yard or indicate if the meter is in an unusual location. Data are then uploaded that night through IBM Series/1 minicomputers into the utility's billing and data-

(Continued on page 114)

AT&T Teletype's 5310B dot-matrix printing terminal prints up to six copies of a document at 200 characters per second.

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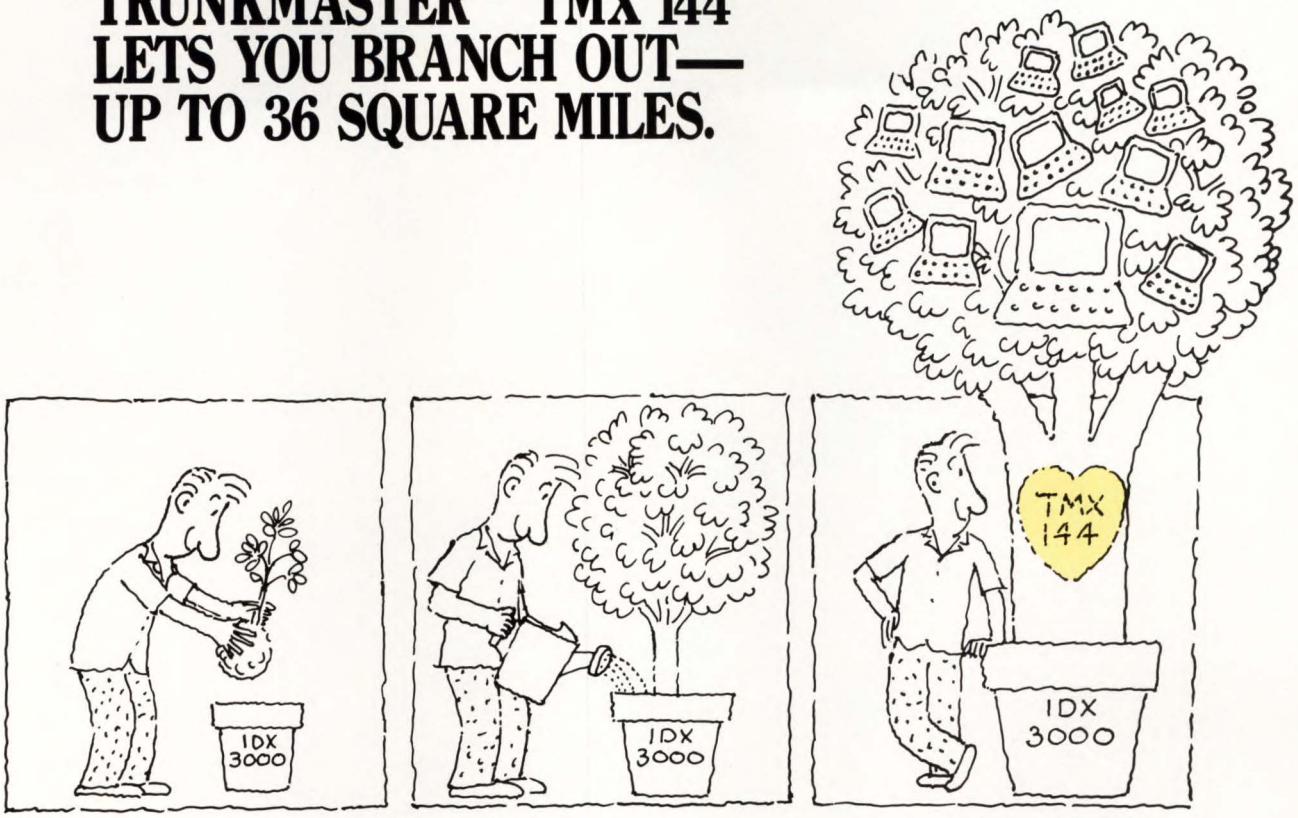

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THE T1-EFFICIENT NETWORK

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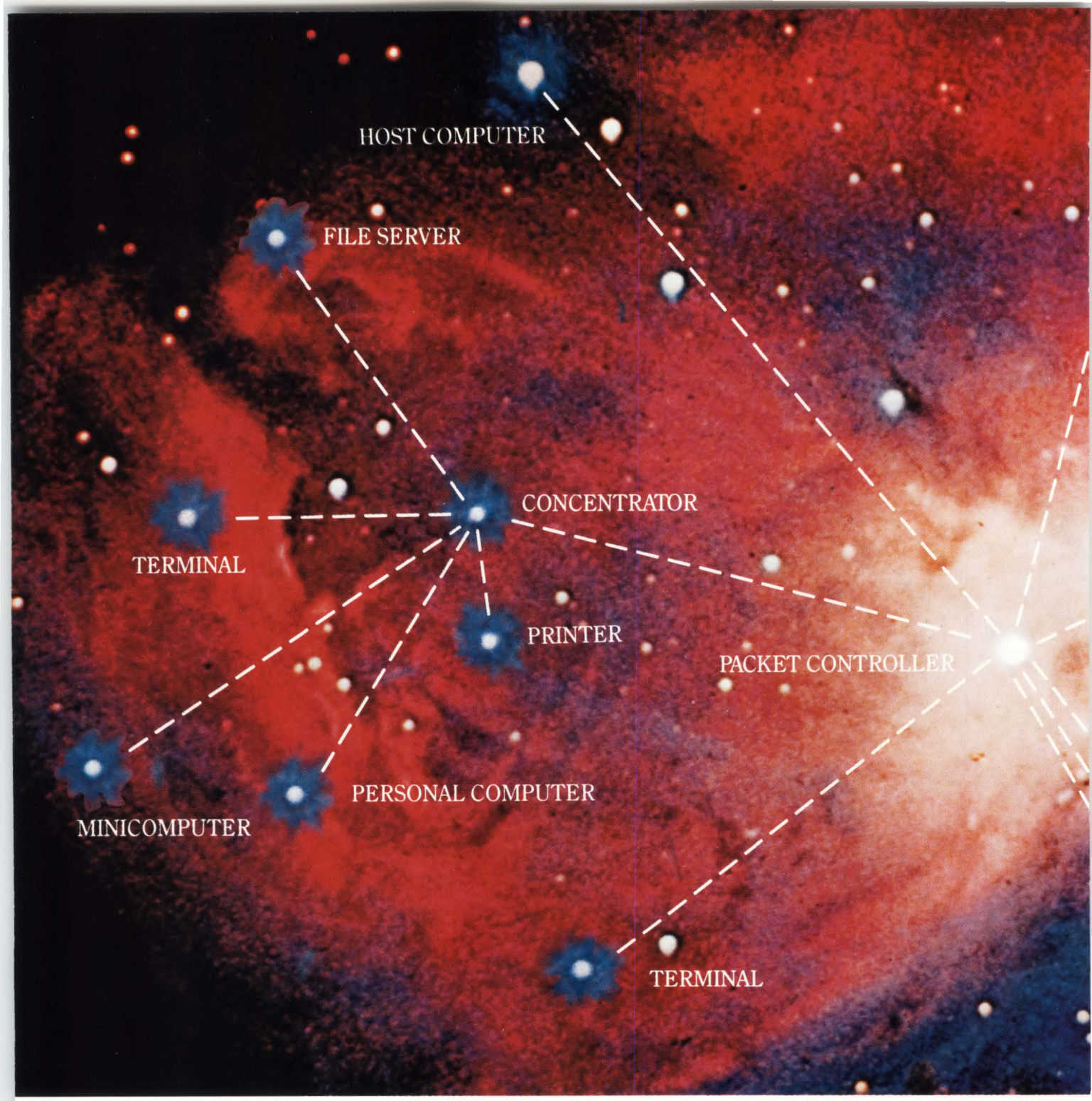
CIRCLE 21



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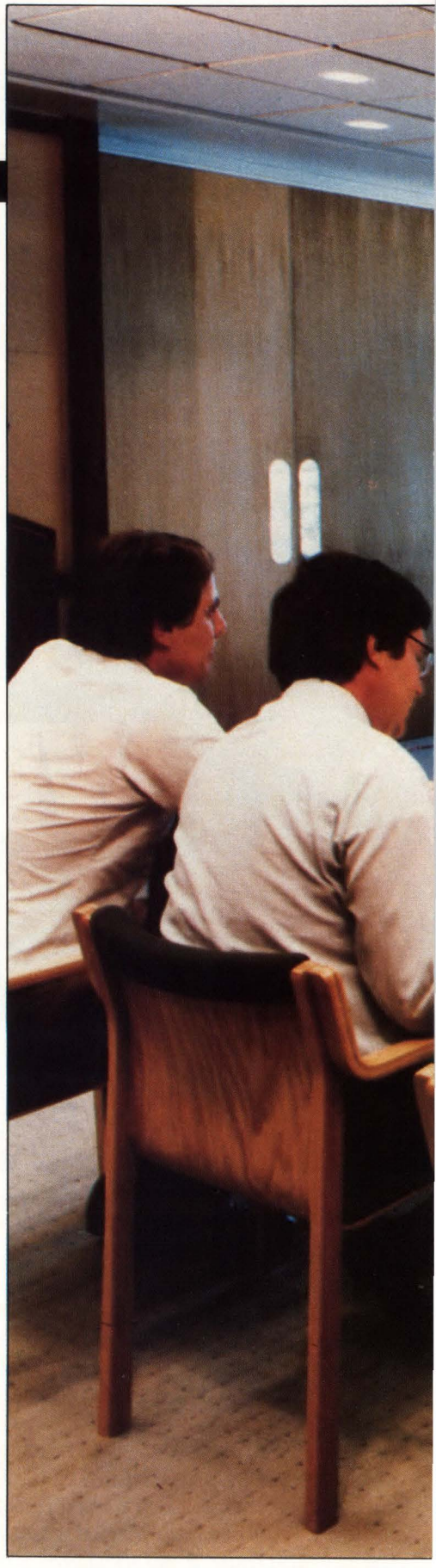
CORPORATIONS CONQUER DISTANCE

Despite corporate skepticism, affordable video conferences may soon become the medium of long-distance meetings.

by Susanna Opper and A. David Boomstein



The video conference was interrupted due to technical difficulties. Like a child's kaleidoscope, colors danced on the 60-inch screen—pretty, but meaningless. The corporate participants squirmed in their seats, and began to talk nervously to their neighbors. Then the screen went blank. Finally, communication was reestablished with a backup audio system—a pale and disappointing replacement for the full-color, full-motion video used successfully for most of the coast-to-coast meeting. After an abrupt audio sign-off, the New York contingent limply waved good-bye to the blank screen and to the unseen participants at the other end of the country.

Corporations have approached video teleconferencing with much trepidation, largely due to failures like the one described above. That true story and others like it have contributed to corporations' slow acceptance of video conferencing. In 1980, *Business Week* ballyhooed Atlantic Richfield's video-conferencing program. Anyone who read the article would have expected airplanes to be empty during business hours by this time. Yet in last year's June 15 issue of *Computer Decisions,* editor Mel Mandell called video conferencing an "underwhelming technology." And oft-quoted *Megatrends* (Warner Books, 1982) author, John Naisbitt, says it's "so rational it will never succeed."

High costs, a high failure rate, and rapidly changing technology are major reasons why corporations are leery about video conferencing. But not all companies have kept away from the technology. In fact, a few farsighted leaders are tackling the many challenges presented by video conferencing, and are finding rewards in dollars and efficiency.

What is a video conference? It's a business meeting or event aired over satellite relay or telephone lines that allows managers and employees at remote locations to view graphics, and other participants, on a video screen set up in a video-conference room. The most common type of conference, the ad hoc video conference, is used to air a special event. Everything, from the launching of a new product to an after-dinner speech, can be the subject of an ad hoc video conference.

Until recently, most video conferences were ad hoc and accompanied by high expectations. These conferences require a lot of planning, room management, special decoration, and design, and a weak link in the plans, or a technical failure, can turn an impressive event into an embarrassing moment. Most often in the recent past it was the embarrassing moments that were reported to the press. Less frequently mentioned were the successes —for example, those of American Express, Newsweek (New York), and Johnson & Johnson (New Brunswick, NJ), the last of which used video conferencing in its highly successful campaign to save Tylenol after the 1982

CONFERENCING

Photo courtesy of Citicorp

random poisonings.

The second type of video conferencing is more useful for conducting business. Initially intended for senior management, these video conferences are used increasingly by all levels of management to conduct meetings among a corporation's dispersed branches. With the right equipment, video conferences require only a fraction more planning than do regular business meetings. And if you consider that travel plans are no longer necessary, the video conference may actually be easier to plan than a regular meeting.

Even so, few corporate proponents of video conferencing have successfully argued for equipment investments. One of the reasons is cost; the right equipment—including room design, lighting, furniture, screens, and cameras—costs about $1 million. Most industry experts guess that only about 20 corporations can hold full-motion, full-color video meetings routinely at their facilities. However, most of these corporations have more than one installation, so that 80 to 100 corporate conferencing rooms are estimated to exist. That number is expected to increase rapidly over the next year, as transmission costs decline and truly transportable systems become more available.

"In most corporations, video conferencing is competing with the mainstream business for capital resources," observes Russ Longyear, manager of company communications at J.C. Penney Co., New York. "To justify the expenditure for decision-makers, the focus should be on how video conferencing can accomplish corporate objectives. You should apply the technology to the organization rather than expect the organization to adapt to the technology."

Another reason for the slow adoption of video conferencing is not often mentioned. Says an expert at a Fortune 500 corporation: "Today's senior managers are used to traditional types of information transfer—looking other managers in the eye or sitting around a meeting table. They can't adjust to the video-conferencing format. In five or 10 years, when managers who grew up with TV, keyboards, and technology reside on mahogany row, you'll see a shift."

Citicorp executives in Los Angeles hash out a strategy with their counterparts in New York. The bank's New York teleconferencing center is pictured on pages 62–63.

Like most new technologies, video conferencing is advancing rapidly. David Amidon, a Burlington, VT, independent consultant in advanced telecommunications, foresees future workstations that provide full-motion video, text, and high-resolution graphics—all fully voice-activated. But don't hold your breath; although the technology is developing rapidly, such systems probably won't be available until the next century.

In the meantime, Amidon advises corporations to take the first step, rather than wait for the technology to stabilize. Corporations have got to grow with their systems. For example, he says, "Citibank's video-conferencing room is state-of-the-art today, but, without modifications, it won't be in a year or two."

"Johnson & Johnson used video conferencing in its campaign to save Tylenol."

The fast pace of developments has not halted Citibank's march toward successful teleconferencing. Early on, the bank made a commitment to leading-edge technology and decided to build a flexible, modular facility, and to add on enhancements as the technology developed and user requirements grew.

Citibank started its teleconferencing project in 1981, before off-the-shelf equipment for in-house conferencing rooms was abundant. For example, meeting participants needed TV-quality lighting to look their best, but the heat and glare of such lights would have destroyed the meeting-room ambiance of the teleconferencing center. It took seven months to design a system that met both objectives. Today, however, several vendors can provide such lighting. Computer-generated graphics also were not available for con-

ferencing then. But today they are—and Citibank is planning to add a multi-media system next year.

Exxon Corp., New York, has also learned to adapt to technological changes. Today, corporate headquarters still uses analog, freeze-frame video conferencing, which involves still, rather than moving, pictures. But executives are seriously considering conversion to a full-motion color system with high-resolution graphics and personal-computer interfaces. Converting will be neither difficult nor expensive—the same room and audio system can be used. New cameras and a new codec (coder-decoder) will be required.

At J.C. Penney, an audio-conferencing system helped pave the way for a more advanced video system, two years later. Says Longyear: "We had a quality audio system that was used extensively by several different groups. But it was inadequate, especially for merchandising. Buyers want to see the available merchandise, so last year we installed a test video system.

"Our experience with audio was invaluable in getting video off the ground," continues Longyear. "We had developed components and had worked the kinks out of the bridging system by the time we installed video."

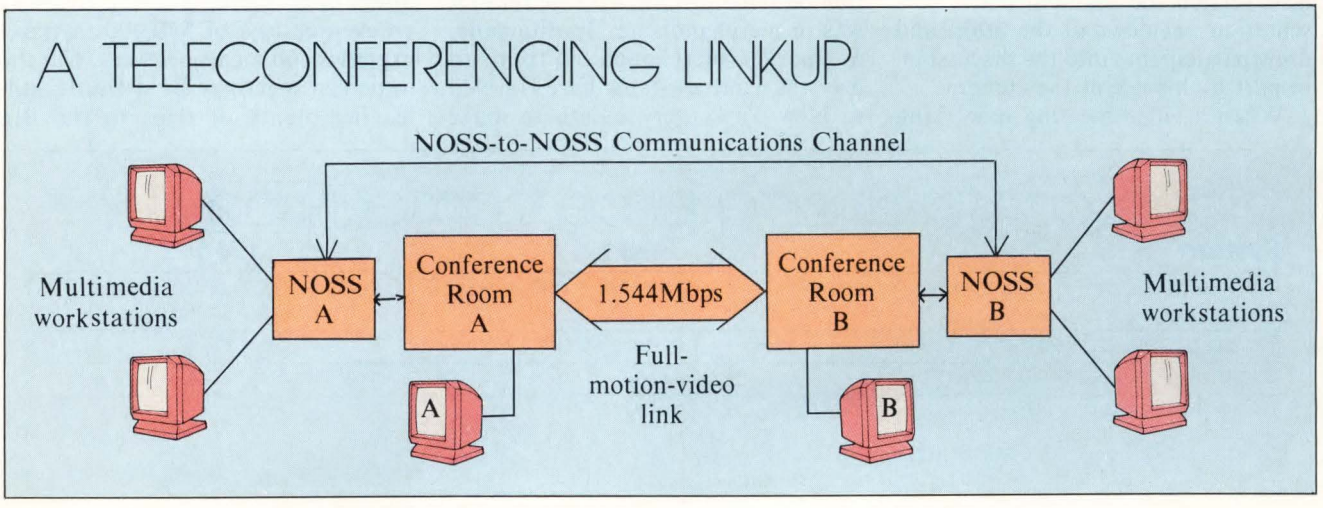
Unlike Citibank, which owns two transponders on the Westar V satellite, J.C. Penney leases a private network from Satellite Business Systems (SBS), McLean, VA. For both companies, and for many others that have installed video conferencing, the video gets a free ride. The network is justified by its main use—voice and data transmission.

Newly available transportable conferencing systems make it easier and cheaper to take that all-important first step. Fully modular units transform a normal conference room with a network interface into a video-conferencing center. Modular units cost less than a fully dedicated room and can be shipped in an air-transport case to any location, usually overnight. Also, they can be installed by one experienced employee in an hour or two.

Citibank has two full-motion color transportable systems—one in San Francisco and the other in Los Angeles. The units can be moved out of the way when the conference room is used for other purposes, and be shipped from the West Coast to other cities. The graphics and video modules are self-contained and can be operated independently or together. The transportables function effectively in most office conference rooms, requiring limited modifications to lighting, power, air conditioning, and acoustics.

Using several built-in cameras, Citibank's units provide both medium- and wide-angle shots of up to eight meeting participants, and medium close-up shots of individual speakers. The cameras can be operated from a control panel, or set to automatically focus on speakers. The graphics system handles opaque materials, viewgraphs, 35mm slides, three-dimensional objects, or anything written on a chalkless board. The audio system is built-in; participants can be heard from anywhere in the room. The units' audio interface ties into a built-in Touch-Tone telephone, allowing external parties to join an ongoing conference. In Citibank's configuration, each West Coast room has a built-in codec, but the transportable system's shipping cases will also transport the codec to offices without equipment.

As with any new technology, video conferencing demands new behavior from users. It also offers stunning new possibilities. For example, it forces the meeting organizer to plan more carefully. Not only must rooms be scheduled, but agendas should be carefully planned, and camera-suitable graphics prepared. Timing must be precise—the meter starts when the session is supposed to begin, and



stops in time for the next group to set up. These tight controls, in turn, generate a clear idea of the meeting's purpose and more precise role definitions. This is bound to improve the effectiveness of any meeting.

Video conferencing is a user-friendly medium. According to Joyce Thompson, user-services coordinator, Citibank: "People don't need much technical knowledge to use the system. We give a few simple explanations, and in 10 or 15 minutes, they sail right ahead and get to work. Our dedicated room in New York has a simple control panel with a few clearly labeled buttons. The meeting leader can either control the camera or set it on voice-activate to zoom closeup on speakers, or show all the participants when no one is speaking. If several people talk at once, the camera switches to the full view, providing a visual indication of what's going on."

In the beginning, Citibank managers treated video conferencing as the new horseless carriage. Their meetings were little more than the usual face-to-face business meeting—only on camera. It took time for them to become more inventive. "One training manager in the bank did the same session twice," recalls Thompson. "The first time he stood and delivered his lecture from the podium. For the next session, he segmented the presentation, sat down at the table, and drew participants into the discussion, in part by his use of the camera."

When a video meeting is working well, the medium—and the distance between participants—becomes transparent. People learn to read visual feedback on camera, and even to "play to" others on the screen. But such familiarity usually takes time. First-time users are often uncomfortable and concerned about their appearance. (It's no coincidence that the Citibank teleconferencing center has mirrors in the reception room.)

In some systems, the meeting participants can view themselves during the conference. The Citibank system provides that reassurance. It's not set up for self-view (the remote location appears on a rear-projection screen at the front of the room, and graphics appear on a side screen), but it offers self-view as an option. Participants in AT&T Information Services' Picture Phone Meeting Service don't have to ask for self-view; it presents incoming video on one monitor and the outgoing image on the other.

Users often surprise technology planners. When the first phase of J.C. Penney's video system became operational, everyone expected the company's buyers to hop on the line. Instead, it was the accountants, data-processing and systems staff, and credit and financial-services personnel who booked the system.

But the most spectacular application of video meetings at the retailer was in merchandising. Traditionally, 65 market merchandisers from all over the United States have traveled to New York every month to make sure J.C. Penney delivers the latest in women's fashions to more than 800 stores in 50 states. At these meetings, the merchandisers take orders for fashions that corporate buyers have already selected from designers' showrooms.

"To find out if video conferencing would work for these meetings, we set up an unusual test," says Longyear. "We simulated a video meeting, putting the merchants in one room and the merchandise and buyers in a room next door. Then we conducted the meeting over TV. Afterward, the merchants walked next door to see if the clothing they selected was the same quality as the video presentation made it out to be."

"We learned several things from this test. First, merchants need the highest possible picture quality, faithful color reproduction, and good motion handling to get an accurate picture of the merchandise. We also had to find a substitute for touch—merchants are accustomed to handling fabrics, so we trained the buyers in the art of describing how garments feel. On the plus side, a closeup on camera may reveal more detail about apparel than the naked eye can perceive."

This single activity justifies the expense of J.C. Penney's system. Decision-makers figure the merchandisers meet 12 to 14 times a year at an average cost of $40,000 in travel expenses and meals per week. Cut the in-person meetings by a third—still leaving plenty of trips to the Big

Video conferencing price comparison

System	1981	1984
Dedicated conferencing center (average)	$250,000-1 million (av. $750,000)	$350,000-$1.1 million (av. $740,000)
Transportable conferencing system	not available	$85-150K
Compression systems (codec)*	$175K	$95-120K
Transmission via T-1 New York to Los Angeles	$1,000/hr	$750/hr

* 1.5 MBps. (56KBps av. $30K-$40K per system).

"See you online" might be a signoff to this meeting via AT&T's Picture-phone Meeting Service. AT&T touts its service as a big productivity-raiser.

Apple—and you've got a $160,000 saving. And that doesn't account for savings in management time, or for the resulting increase in field merchandisers' productivity.

Citibank also finds its system saves money. Any Citibank manager who can justify a trip by airplane to attend a meeting can justify conducting a video conference. Once the conference is set up, all other attendees, in effect, fly free.

But the real benefits of video conferencing aren't necessarily in dollars and cents. The medium allows many people to get involved in meetings they couldn't attend if travel were required. In just three months of operation, Penney's New York-to-Dallas hookup has included 60 employees who would have been left out of traditional meetings. These individuals include senior executives, who now extend greater influence over a wider range of activities, and junior employees, who learn faster and are more involved in projects than they were before video conferencing.

The greatest potential contribution of video conferencing is in white-collar productivity, which is measured in effectiveness and timeliness. Some examples: the technology group that eliminates a whole development stage because video communications are so complete it helps produce a nearly bug-free product; the engineering drawings that don't have to be redone late in product development because all the right groups reviewed them on camera; the design flaws that get caught because operators of pilot systems are interviewed simultaneously by a panel of corporate experts; the job candidate who is screened out after a video meeting, saving the days' worth of executive time that on-site interviews would have taken; the list goes on.

Some applications are so important that they don't have price tags. For instance, the Defense Advanced Research Projects Agency (Darpa) is studying the application of video conferencing during emergencies. In case of a flood, a plane crash, or a product recall, many dispersed groups could use conferencing to share common information and graphics such as maps.

Integrated graphics are key to the future of teleconferencing. Advanced expert systems will create fully integrated, simultaneously shared graphics that can be annotated by one group member and transmitted to all others. But some videographic teleconferencing systems already include shared-graphic workspaces. With such a device, a user on a network can simultaneously view and annotate an image in real time, as it's being discussed.

Another application soon to be available is the ability to combine, store, and manipulate personal-computer graphics, animation, spreadsheets, text, and video images. Less imminent is the ability to share a video image among more than two interactive sites. The equipment that will create this breakthrough is a Network Operations Support System, or NOSS. Systems, now in development, will be able to receive signals from one remote site, pass them through a traditional teleconferencing system to another facility, and from there branch the image out to a network of other viewers hooked into a second facility. So far, the fly in this ointment is that when one remote site fails to get the picture, all systems must wait for a successful transmission before the meeting can proceed.

Artificial intelligence is key to the development of NOSS. As a system controller, NOSS will direct millions of bits of data traveling in opposite directions. Additionally, it will control standards conversions and distribute control signals to hardware at remote sites. NOSS

"A technical failure can transform a video conference from an impressive event into an embarrassing moment."

will also perform quality control. If an image is unreadable (say, blue on blue), it will make an adjustment before sending it to viewers. The system will also handle such tasks as scheduling rooms, billing, data collection, statistical evaluation, and file management. The ultimate smart system will receive instructions through a continuous voice-recognition subsystem. But these systems won't become commercial for 10 years or more.

"All the elements of these future systems exist today," remarks David Amidon, who was formerly with the Institute for the Future, a research center in Menlo Park, CA. "The problem is in creating the software to control the passing of information from one system to another. There's no integrated research. Everything exists—but it's in someone's garage or microprocessor. The technology will be assembled in a modular way—a piece here and a piece there, like a mosaic."

Long before these futuristic video-conferencing systems are available commercially at prices your organization can afford, other trends will influence how business uses video conferencing. For example, if your company can't justify a dedicated or transportable video-conferencing system of its own, it can use the public AT&T and Isacomm Corp. facilities, or lease facilities on a short-term basis from large corporations such as J.C. Penney. Organizations that have already invested in a system only need to cover costs to make a modest return on investment so rates and facilities may be favorable for businesses that are not ready to invest heavily in equipment of their own.

Someday there will be stand-alone, multioption systems that do everything from receive voice commands in ordinary language to create fully defined graphics from a concept or partial set of numbers. But between now and the 1990s, when such systems are expected, users will have an ever-increasing graphic and video buffet from which to select. Just as today you might choose between a three-way phone conversation or an in-person meeting, in the very near future your options will expand to convenient, easily affordable video meetings, audio conferencing with graphics, or text-based computer conferencing with graphics. Wise users will ask themselves who they are trying to reach and what they are trying to accomplish, and then select the medium that produces the best results in the least time at the lowest price. Sometimes the answer will be video, sometimes a personal-computer network, and sometimes you'll pick up the phone. □

Susanna Opper is a New York communications consultant. A. David Boomstein is national program coordinator for teleconferencing services and systems at Citibank and founding president of the International Teleconferencing Association.

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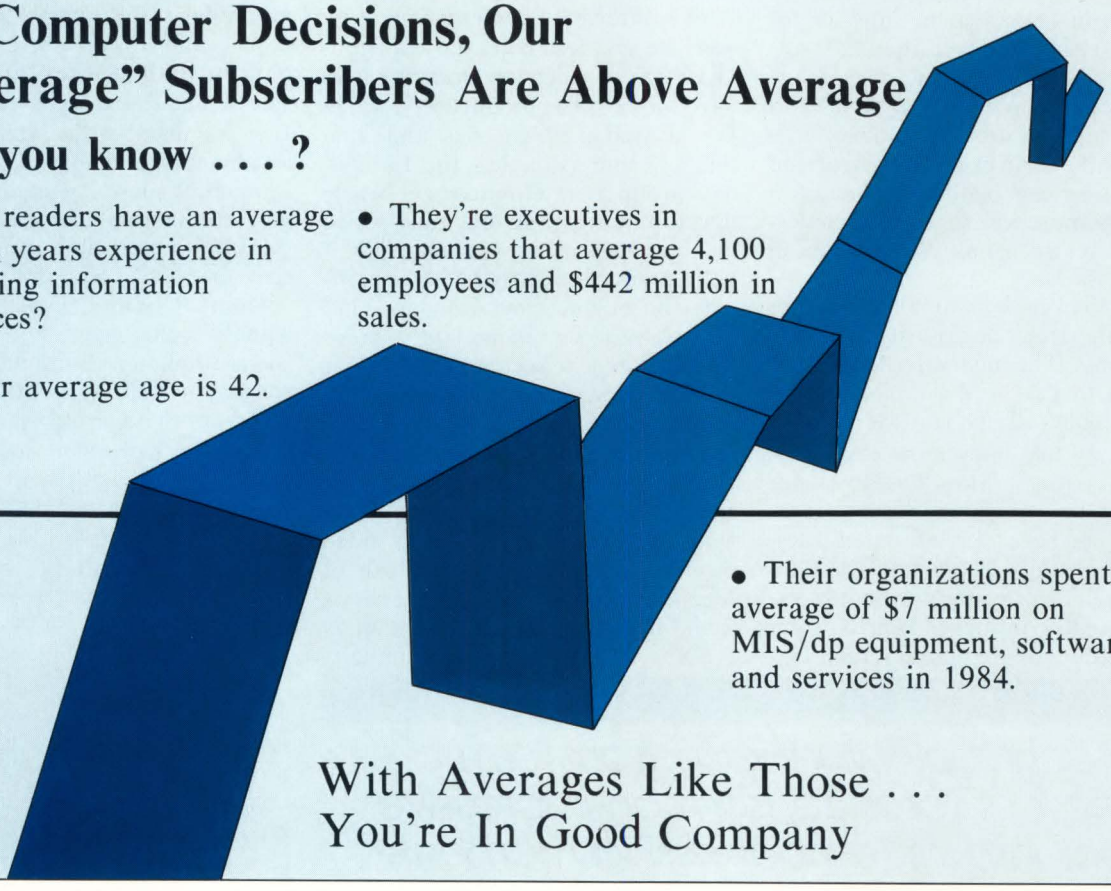

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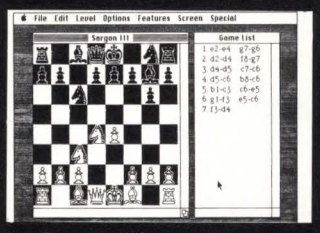

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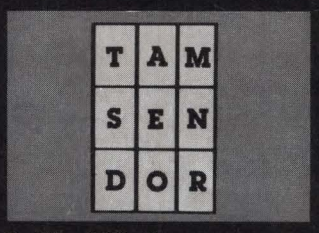

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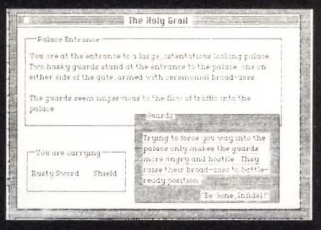

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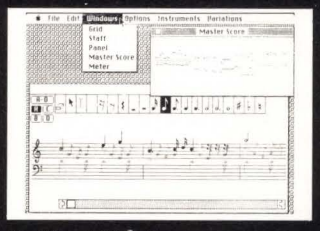

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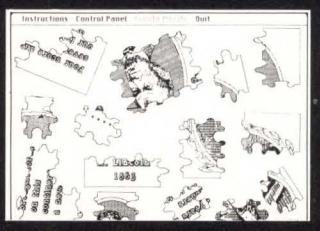

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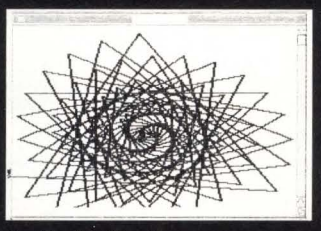

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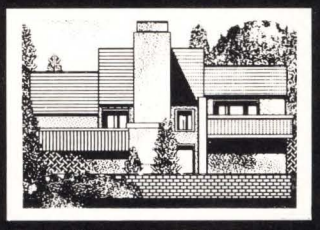
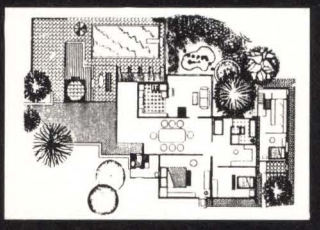


7. da Vinci, Buildings.



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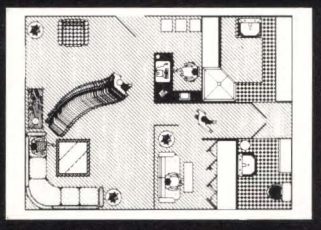

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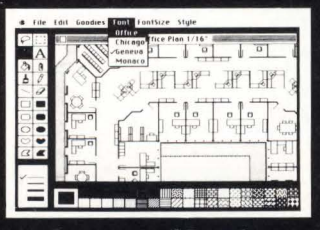

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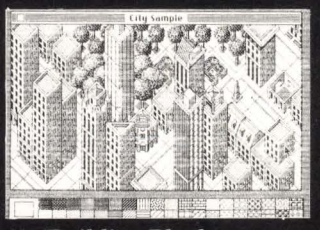

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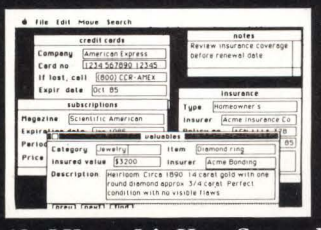

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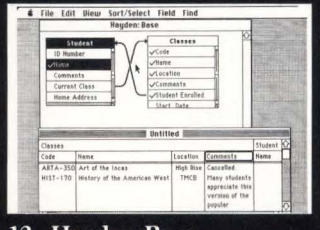

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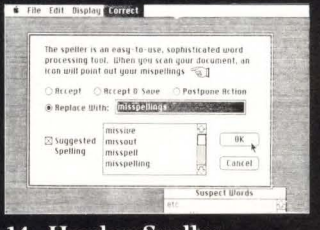
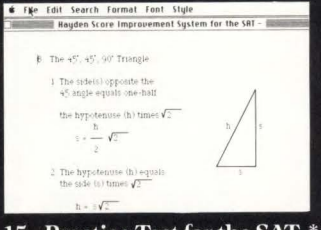


14. Hayden:Speller.



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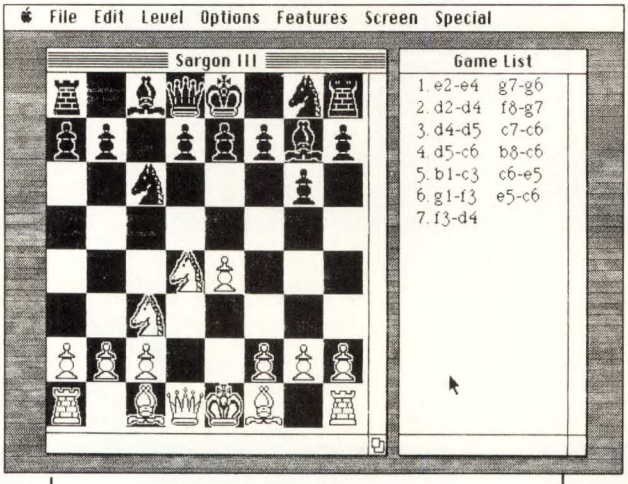

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In a tournament sanctioned by the U.S. Chess Federation, Sargon III beat a master rated 2209. That makes Sargon III the only microcomputer program ever to defeat a player at that level.

Software reviewers for computer publications consistently rank Sargon as the leading microcomputer chess program.

And in keeping with Sargon's tradition of excellence in chess, each year Hayden awards the prestigious Sargon Cup to the winner of the U.S. Chess Federation's U.S. Open.

In addition to the Macintosh, Sargon III also operates on Apple™ II+, IIe, IIc, Commodore 64™ IBM PC™ PCjr™ and popular compatibles.

Sargon III. Only $49.95. See your local software dealer, or contact Hayden Software, 600 Suffolk Street, Lowell, MA 01854, phone toll-free 800-343-1218.

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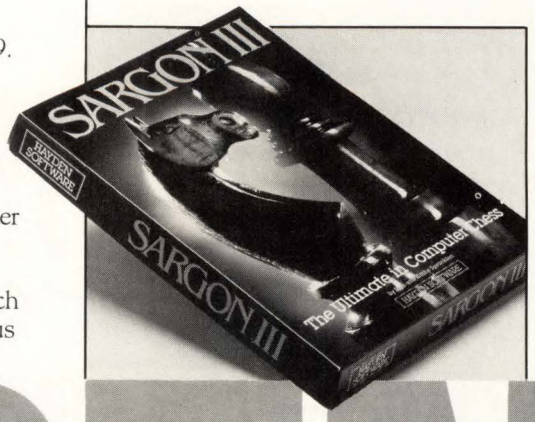


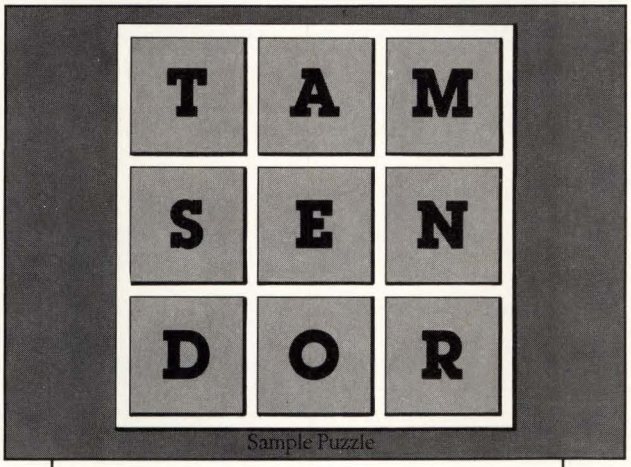
HAYDEN

WORD CHALLENGE.™
THE BEST WORD GAME YET.
IT'S MIND BOGGLING FUN.

IF YOU LIKE WORD GAMES, HERE'S THE ONE FOR YOU.

Word Challenge. A mind boggling computer game in which you compete head to head against LEX™ and his 90,000 word lexicon. It's a race against the clock. You and LEX each form words as quickly as you can by connecting randomly generated letters inside a playing grid.

You win points for every word you found that LEX didn't. Word Challenge keeps the score.



Sample Puzzle

Can you beat LEX?

HOW MANY WORDS CAN YOU FIND IN THIS WORD CHALLENGE GRID?

Words are legal if their letters touch in sequence on any side or corner. "TEAM" is legal, while "TEAMS" is not, since the "S" does not touch the "M." LEX, playing at a "friendly" level, found 23 words of three letters or more. At his most competitive, LEX found 110 words (see list to the right). Can you do better?

Play Word Challenge alone or with a group. See if your family or friends together are wordy enough to bring LEX to his knees. You'll have a lot of fun and learn a new word or two in the process.

Word Challenge operates on Apple™ II+, IIe, IIc, Macintosh,™ Commodore 64,™ IBM PC,™ PCjr.™ and popular compatibles.

Word Challenge is part of Hayden's HeadStart Program which allows schools to accumulate points toward free computers, peripherals, and software. Buy Word Challenge, and your school will receive 20 HeadStart Points.

Word Challenge. Only $39.95. Contact your local computer software dealer or Hayden Software, 600 Suffolk Street, Lowell, MA 01854, phone toll-free 800-343-1218.

Word Challenge and LEX are registered trademarks of Hayden Software Company, Inc. Word Challenge is based on Proximity Linguistic Technology.
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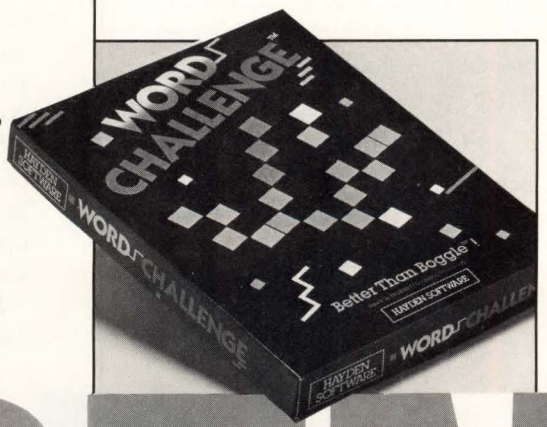
IBM PC and PCjr are registered trademarks of International Business Machines, Inc.
Commodore 64 is a registered trademark of Commodore Business Machines.

Puzzle Answers

Here's what LEX found. Can you do better?

tam	sane	sepon	manes
tamer	sane	nope	maned
tame	same	pou	mane
tamed	rose	nets	man
team	roes	net	etas
teas	rod	nest	eta
tea	rods	neat	eon
tan	rode	names	eats
tames	rod	named	eat
tamer	rest	name	east
tamed	sped	met	dose
tame	redo	meson	dos
tam	red	mesa	done
stern	reason	men	donates
stem	ream	meats	donate
steam	ornate	meat	don
stamen	ores	mean	does
sore	ore	mats	doer
son	ones	mates	doe
sod	one	mated	den
set	sepo	mate	dean
senor	epo	mat	ate
seat	nosed	master	astern
seam	nose	mast	aster
sea	sou	pened	anodes
sated	nor	mason	anode
sate	spou	maser	amen
sat		manor	aeon



HAYDEN.
AMERICA'S FIRST FAMILY OF SOFTWARE.

HAYDEN

PIT YOUR PLUCK AND WIT AGAINST THE FORCES OF EVIL IN THE MYSTICAL GAME OF THE HOLY GRAIL.

IT GETS BETTER WITH TIME.

For centuries, valiant knights have pursued in vain the fabled Holy Grail.

Thank the fates, oh brave adventurer, that you come better equipped in your search than the many who went before you. They had naught but the brute force of sword and lance. You have something far, far mightier, the awesome power of your Macintosh™ and the wondrous game of The Holy Grail. With those two at your beckoning, you can journey through the medieval countryside; do battle with bold knights and foul dragons; converse with kings, thieves, and clerics; rescue a fair princess; and pursue a treasure which has eluded mankind for ages.

ACT QUICKLY. THIS GAME WILL NOT BE THE SAME AFTER YOU TURN THE PAGE.

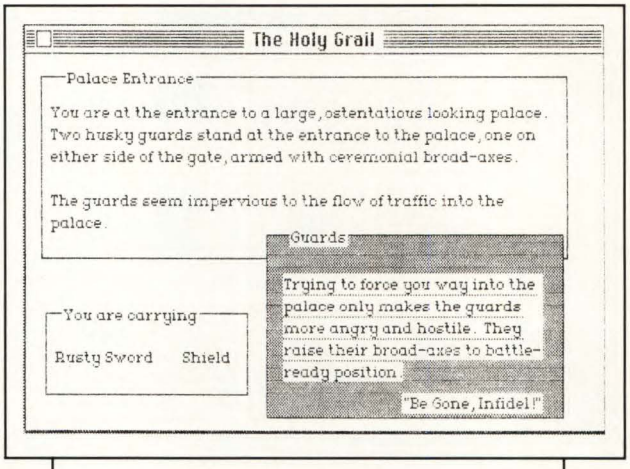
The Holy Grail is one of Hayden's innovative new TimeQuest™ Adventure games. In these games of interactive fiction, the passage of time plays an active and crucial role. The whole nature of the game changes instantly, before your very eyes. If you aren't wise enough or swift enough to take advantage of circumstances, you may forever alter the course of your future.

So come! Through the ages, countless others have tried and failed. Now it's your turn. Take up the quest. Succeed, and you catch a glimpse of immortality.

But be wary! Myriad pitfalls lurk. You will need extreme cunning if you are to evade the treacherously clever villainy you will encounter along the way.

If you be the least bit faint of heart, try some other game instead. For dangerous adventures aplenty await you in your bold attempt to unravel the age-old secret of The Holy Grail.

The Holy Grail. Only $49.95. See your local software dealer, or contact Hayden Software, 600 Suffolk Street, Lowell, MA 01854, phone toll-free 800-343-1218.



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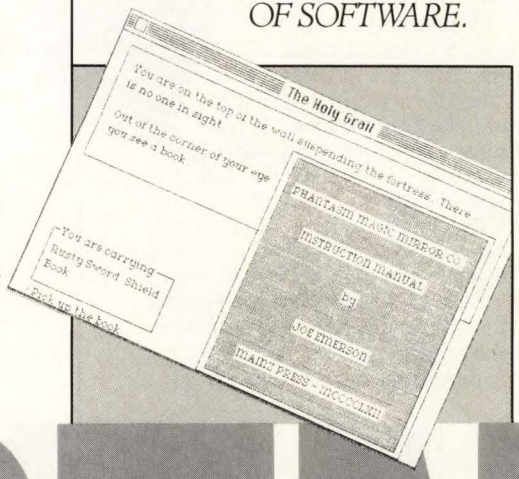


HAYDEN

MUSICWORKS™ BRINGS OUT THE MUSIC IN YOU.

WRITE THAT TOP 40 HIT YOU'VE ALWAYS DREAMED OF.

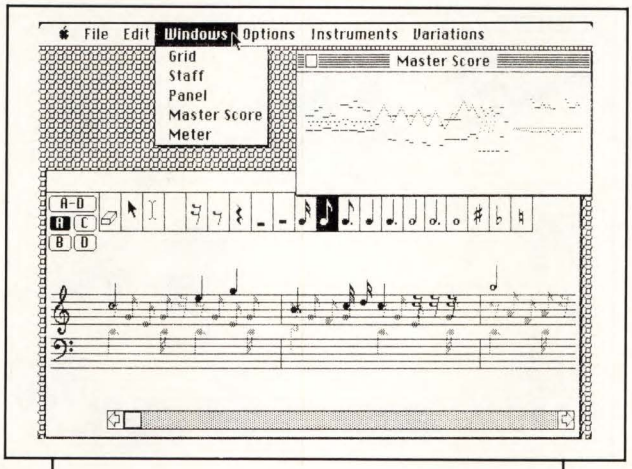
With MusicWorks you can compose music directly on your Macintosh™ and hear the results instantly.

Even if you can't read a note, you can easily use MusicWorks to produce professional musical scores. You compose on a seven-and-a-half octave grid that corresponds to the keys of a piano. Use your mouse to place "notes" on the grid. As you place them, you hear them. When you've got your song the way you want it, MusicWorks can transform your grid into a musical staff, insert the proper musical notation, and print it out in a professional format which any musician can follow.

If you already know musical notation, you can compose directly on a staff. Use the mouse to place your notes, to select the meter and key signatures, and to listen to your music instantly.

Either way, grid or staff, if you make a mistake or want to change something, simply erase and edit.

You can play back your whole composition or any part of it whenever you want.



ORCHESTRATE 4 PARTS SIMULTANEOUSLY.

Choose any 4 instruments from out of a selection of 10. You've got piano, chimes, flute, trumpet, organ, even a synthesizer for that contemporary electronic sound.

You can hear all four instruments at once, or turn them off selectively so you can alter individual parts.

A LITTLE BACH IN EVERY BOX.

MusicWorks comes with templates which guide you through the instructional process by playing classical and popular selections.

MusicWorks is part of the Hayden HeadStart Program which allows schools to accumulate points toward free computers, peripherals, and software. Buy MusicWorks, and your school will receive 50 HeadStart Points.

MusicWorks. Only $79.95. Contact your local computer software dealer or Hayden Software, 600 Suffolk Street, Lowell, MA 01854, phone toll-free 800-343-1218.

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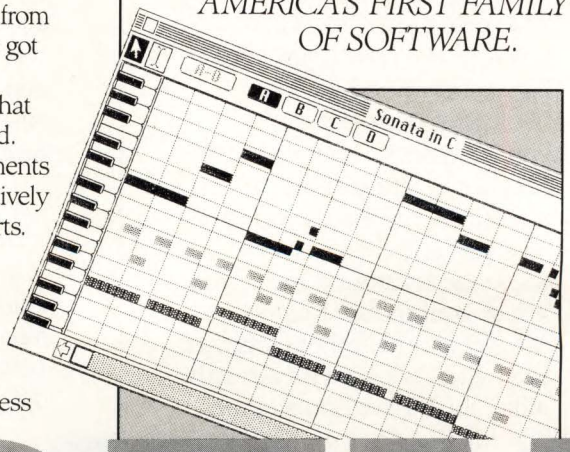


HAYDEN

TURN YOUR MOUSE, YOUR HOUSE, OR YOUR SPOUSE INTO A JIGSAW PUZZLE.

MASTERPIECES.™ HOURS OF FUN FOR JIGSAW LOVERS.

MasterPieces turns any MacPaint™ image into a jigsaw puzzle.

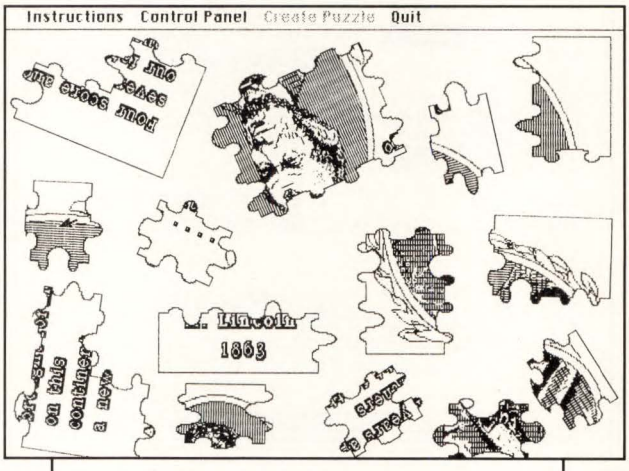
Here's how it works.

You put an image on your screen. Any one you want. Try one of the pictures that come with MasterPieces. Or use MacPaint or MacDraw™ to create an image of your own.

Next, select the number of pieces in your puzzle. You can have as few as 9 or, for a real challenge, as many as 196. Then pick from three levels of difficulty. This determines how close together you have to get your pieces before you get a fit.

Click your mouse, and your Macintosh™ automatically fragments your picture into the number of pieces you've selected, and then scatters those pieces around the screen.

Use your mouse to move the pieces and fit them together. No two puzzles are ever exactly alike. You'll have hours of fun reassembling your own custom-made jigsaws.



If you have to leave before you're finished, you can store your partially completed puzzle and come back to it later.

If you want to quit altogether, you can have MasterPieces automatically reassemble the puzzle for you.

FUN AND EDUCATIONAL, TOO.

In addition to being an enjoyable pastime, MasterPieces also helps children develop better hand/eye coordination, develop their fine motor skills, and visually discriminate shapes.

MasterPieces is part of the Hayden HeadStart Program which allows schools to accumulate points toward free computers, peripherals, and software. Buy MasterPieces, and your school will receive 50 HeadStart Points.

MasterPieces. Only $39.95. Contact your local computer software dealer or Hayden Software, 600 Suffolk Street, Lowell, MA 01854, phone toll-free 800-343-1218.

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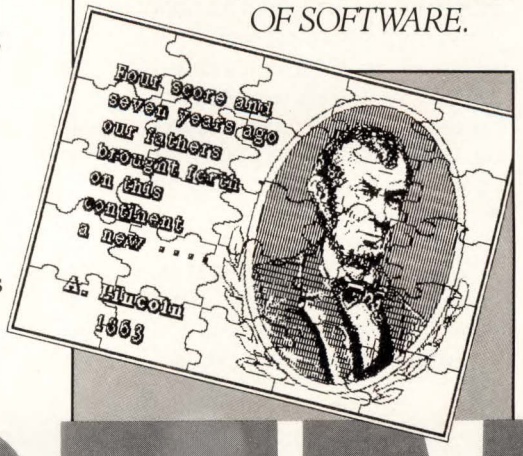


HAYDEN

TURBO TURTLE™ FOR THE MACINTOSH.™ EASIER TO USE THAN ANY OTHER TURTLE GRAPHICS PROGRAM.

STUDENTS LEARN THROUGH THE PROCESS OF DISCOVERY.

With Turbo Turtle, students quickly develop an intuitive understanding of the Logo computer language.

Turbo Turtle is easy to learn and fun. In short order, even preschoolers can develop logical thinking and problem-solving skills.

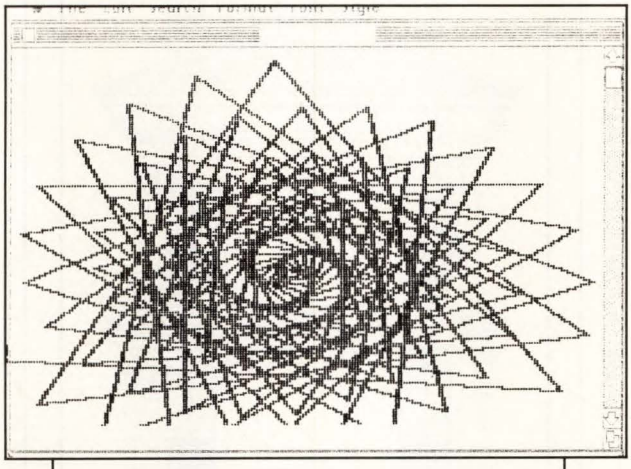
HERE'S HOW IT WORKS.

Students write instructions to move the turtle around the screen. Everywhere the turtle goes, it leaves a track. These tracks then become graphic designs.

Students typically start by using the turtle to draw simple geometric patterns, like squares, rectangles, and triangles. Then they combine these simple patterns into more complicated procedures to form intricate patterns. With a bit of practice, these procedures can be used to create extremely sophisticated computer programs which produce very complex graphic designs.

The graphic feedback provided by the turtle lets students see instantly how their programs operate and what they have to do to change them.

Students consistently find Turbo Turtle rewarding and intellectually stimulating. As students experiment with the turtle, they learn to program in a challenging and reinforcing environment. They learn how to use the computer to think logically and to be creative.



USES THE SAME COMMANDS AS THE WELL-ESTABLISHED APPLE™ LOGO LANGUAGE.

That means you can use any of the dozens of Logo instructional books for Turbo Turtle, too.

Turbo Turtle is part of Hayden's HeadStart Program which allows schools to accumulate points toward free computers, peripherals, and software. Buy Turbo Turtle, and your school will receive 50 HeadStart Points.

Turbo Turtle. Only $49.95. Contact your local computer software dealer or Hayden Software, 600 Suffolk Street, Lowell, MA 01854, phone toll-free 800-343-1218.

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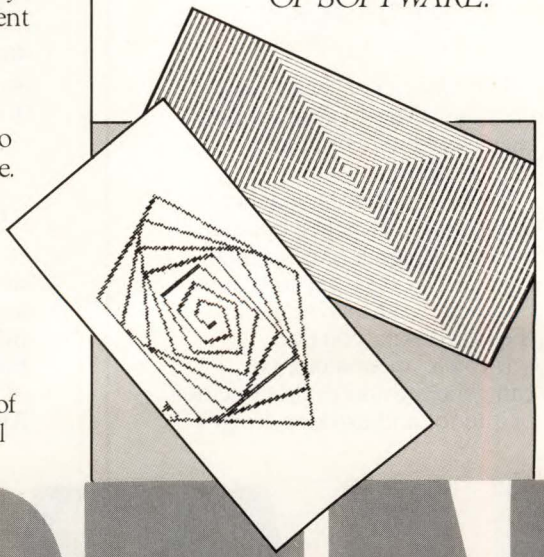
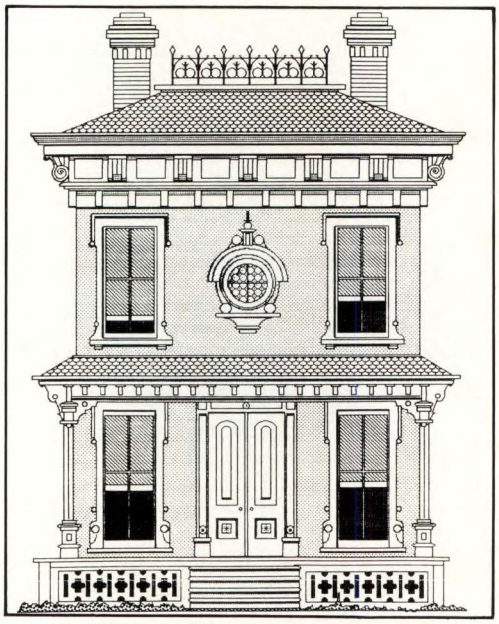


HAYDEN

BUILDINGS, LANDSCAPES, INTERIORS: DA VINCI™ HAS GRAND DESIGNS ON YOUR MAC.



NAIL DOWN YOUR DREAM HOUSE. ONLY $49.95.

Hayden's three new daVinci graphics packages—Buildings, Landscapes and Interiors—let you use your Macintosh to design a house or an office, landscape it, and arrange the interior.

DaVinci works with your MacPaint™ program. Each daVinci package gives you hundreds of design selections. Use them as is, or alter them to suit your own ideas. Deletions or additions are no harder than a sweep and click of your mouse.

SEE THE FOREST OR THE TREES.

The daVinci packages cost only $49.95 each. You can use them separately or in any combination.

If you're a professional landscape architect, office planner, interior designer or office manager you'll easily pay for your package in time savings with the first design you do.

If you're an amateur, you can generate and evaluate scores of interior and exterior designs without worrying about hefty consulting fees.

Or perhaps you just like to draw. DaVinci gives you the perfect opportunity to create a world of imagination.

REARRANGE YOUR FURNITURE WITHOUT HURTING YOUR BACK.

The components in daVinci were designed by noted professional artist, sculptor and printmaker David Adamson, a Fulbright Fellow, and Professor of Art at the Corcoran School of Art in Washington, D.C. He formulated them to be both artistically pleasing and functional in construction terms.

The daVinci components are scaled to give your designs true professional quality.

Of course you can print out your designs on your Macintosh Imagewriter.™

To put daVinci to work, see your local software dealer, or contact Hayden Software, 600 Suffolk Street, Lowell, MA 01854, phone toll-free 800-343-1218.

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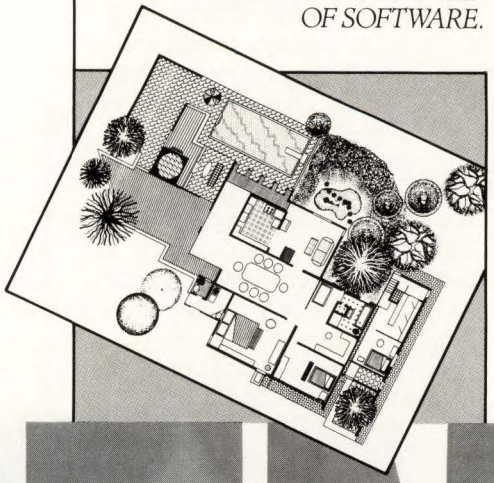


HAYDEN

PUT POWERFUL, COMPUTER-AIDED COMMERCIAL INTERIOR DESIGN ON YOUR MAC. ONLY $199.95.

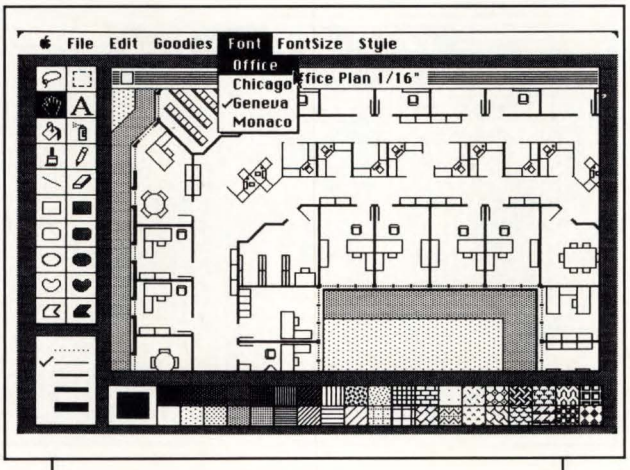
USE DA VINCI™ COMMERCIAL INTERIORS TO DESIGN ANY OFFICE SPACE.

Hayden's new daVinci Commercial Interiors. A simple, easy-to-use tool for effective space planning. Commercial Interiors works with your MacPaint™ program. It contains carefully scaled images of everything you need to design the interior of any commercial space, from a single modular office to an entire corporate complex. It includes desks, chairs, conference room furniture, theater seats, lunch room equipment, exercise facilities, library equipment, duplicators, even personal computers, word processors, and peripherals. Plus modular walls, coat closets, lavatory facilities, and more. Use them as is or alter them to suit your own ideas. Deletions or additions are no harder than a sweep and click of your mouse.

The unique keyboard replacement set shown here simplifies your design process even more. Each key represents a standard scaled image. To insert one of these images into your plan, simply hit the appropriate key. To change scale merely change your font size.

With Commercial Interiors, you'll produce totally professional plans, as good as anything you're likely to see on systems costing up to 20 times more.

Commercial Interiors was designed by James Stokoe, a leading architect, and David Adamson, a well-known graphic artist.



COMMERCIAL INTERIORS CAN ACTUALLY HELP PAY FOR YOUR MAC.

Architects and interior designers can now use automation to increase business.

Corporate office or facilities planners and office managers can save the costly expense of outside consultants by using daVinci to plan new office spaces or to rearrange existing furniture, equipment, and modular walls.

Commercial Interiors can easily cut a three-week design project down to a matter of days. Design revisions take only minutes. So everybody reduces expensive time costs.

USE COMMERCIAL INTERIORS WITH OTHER HAYDEN DA VINCI PRODUCTS.

For total interior and exterior design plans, use Commercial Interiors in conjunction with daVinci Buildings and daVinci Landscapes.

To put Commercial Interiors to work on your Macintosh,™ see your local software dealer, or contact Hayden Software, 600 Suffolk Street, Lowell, MA 01854, phone toll-free 800-343-1218.

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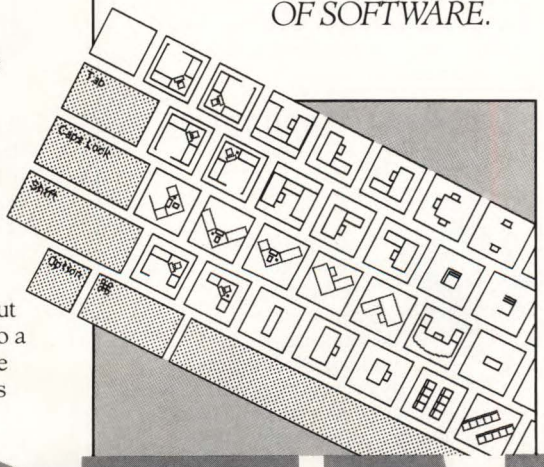
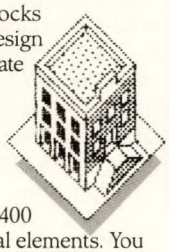


HAYDEN

SHORTEN SKYSCRAPERS, MOVE YOUR GARAGE OR REDESIGN THE PARTHENON WITH DA VINCI™ BUILDING BLOCKS.

A TOTALLY UNIQUE CONCEPT OF AUTOMATED ARCHITECTURAL DESIGN.

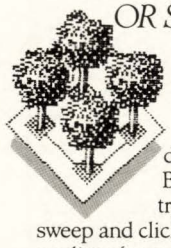


daVinci Building Blocks is a computer-aided design system that lets you create fully realistic, three-dimensional views of any architectural structure.

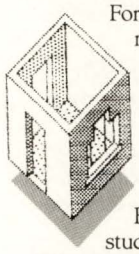
Building Blocks consists of more than 400 individual architectural elements. You work with them in exactly the same way you would with traditional toy blocks. Stack them up, put them side by side, arrange them in any form or pattern to suit your purposes.

Building Blocks works with your MacPaint™ program. So you can easily alter your basic blocks. Or manipulate the style and surface character of your constructions.

AN INVALUABLE TOOL FOR ARCHITECTS OR STUDENTS.



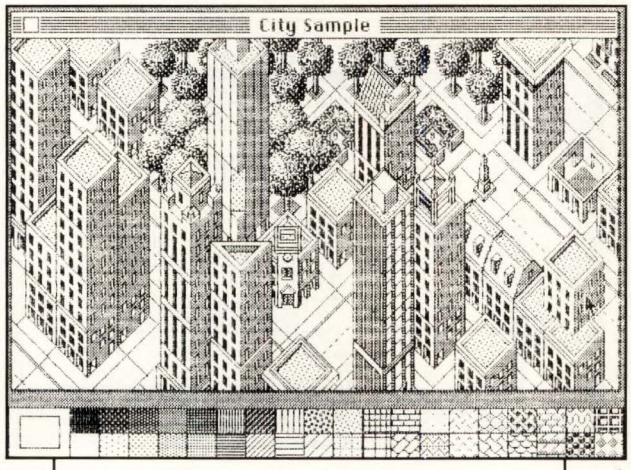
Architects will find Building Blocks an excellent way to generate and revise design ideas. With Building Blocks, you can try out new ideas with every sweep and click of your mouse. The top quality of your final renderings makes them ideally suited for presentations or for illustrations in scholarly articles.



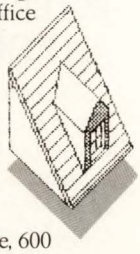
For students, Building Blocks makes architectural history come alive. With Building Blocks, students can actually see the kinds of problems architects faced in designing existing structures. With "Villa Blocks," for instance, students can recreate most of Palladio's famous villa designs. And then alter these villas into new designs of their own. Students can also experiment with the interchange of stylistic elements from various historical eras.

USE BUILDING BLOCKS WITH OTHER HAYDEN DA VINCI PRODUCTS.

For total interior and exterior design plans, use Building Blocks in conjunction with daVinci Buildings, daVinci Landscapes, and daVinci Commercial Interiors.



Whatever you want to design—a house, a new company office building, or a new world—daVinci Building Blocks gives you the means.



Building Blocks. Only $79.95. To put Building Blocks to work on your Macintosh,™ see your local software dealer, or contact Hayden Software, 600 Suffolk Street, Lowell, MA 01854, phone toll-free 800-343-1218.

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HAYDEN. AMERICA'S FIRST FAMILY OF SOFTWARE.

HAYDEN

I KNOW IT'S HERE SOMEWHERE.™ THE COMPUTER PROGRAM THAT GETS YOUR FACTS STRAIGHT.

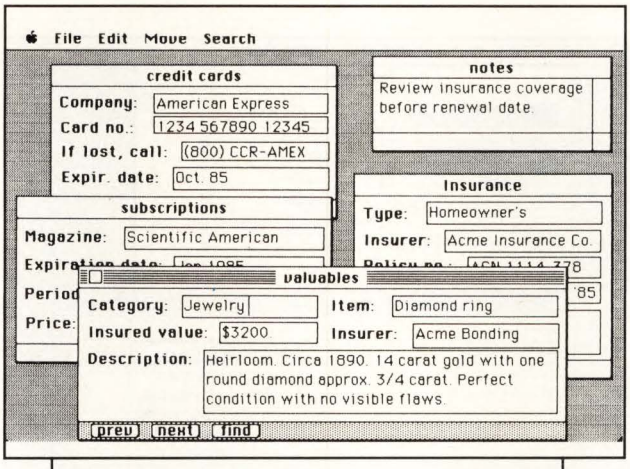
FOR ANYONE WHO WANTS TO BE ORGANIZED BUT CAN'T SEEM TO MAKE IT HAPPEN.

"Why can't I ever find anything when I want it?" Does that sound familiar? If so, you need I Know It's Here Somewhere. I Know It's Here Somewhere is a simple, foolproof filing system for home, business, or school. It gives you a perfect way to catalog and store all that important information you know you have but can never seem to find when you need it most.

Users of large computer systems have been using similar programs for years. They call such programs database management systems. I Know It's Here Somewhere takes that basic, proven concept and simplifies it for everyday use.

ANYTHING YOU CAN CATALOG OR LIST, YOU CAN STORE AWAY ON I KNOW IT'S HERE SOMEWHERE.

To create a format, simply use your mouse to position your basic headings, or fields as they're called, where you want them. That's all there is to it. I Know It's Here Somewhere takes it from there. You supply the information, and the program provides the organization.



The program comes with several standard formats ready for immediate use. There are formats for filing stamps, books, slides, coins, correspondence, recipes, membership lists, names and addresses, credit card numbers, warranty information for household appliances, investments, insurance policies, financial data, capital assets, even the wine in your cellar.

But the program does much more than simply store your information away. It also lets you rearrange it or look at it in different ways.

You can do a sort. Find all the British stamps in your collection, for instance. Then you can do a second sort. Of all those British stamps, find the ones bearing a queen's picture. Or suppose you're doing a mailing, and you want it to go only to single people living within a certain ZIP code. No problem with I Know It's Here Somewhere. Two sorts, and the information is ready for printout.

The program will find any piece of information for you even if you have nothing more to go on than a single letter within its name.

If you do a lot of bibliographies, I Know It's Here Somewhere gives you a special block at the bottom of your screen that you can use to store footnotes. You can then use the program as a word processor to correct, add, or delete your footnotes as you need.

When you see how easy it can be, isn't it time you got organized?

I Know It's Here Somewhere. Only $59.95. Contact your local computer software dealer or Hayden Software, 600 Suffolk Street, Lowell, MA 01854, phone toll-free 800-343-1218.

I Know It's Here Somewhere is a trademark of Hayden Software Company, Inc.

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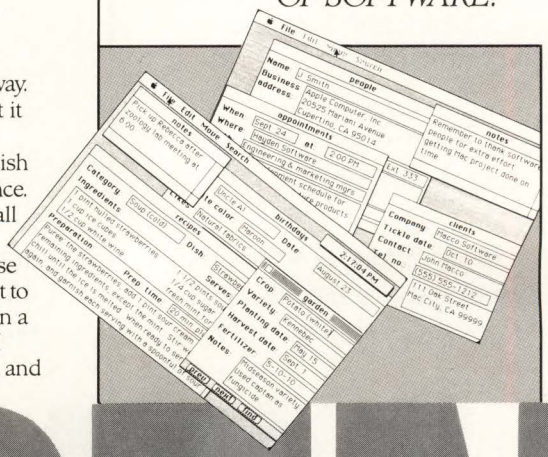

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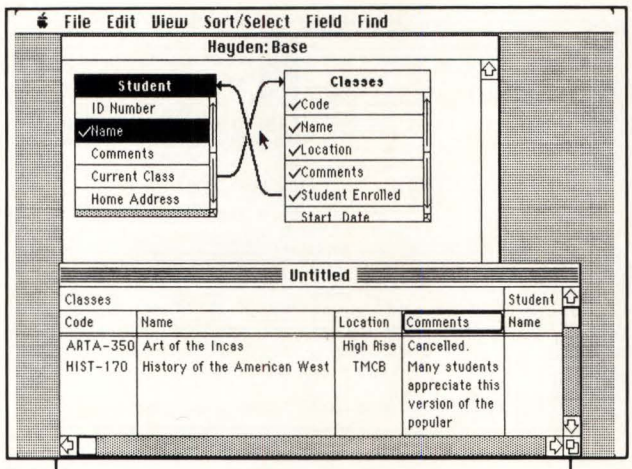

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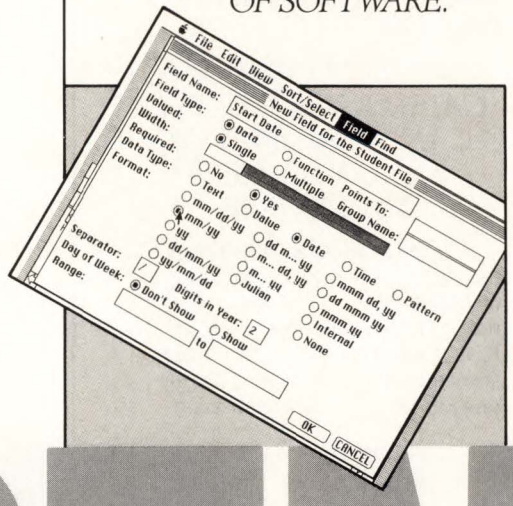

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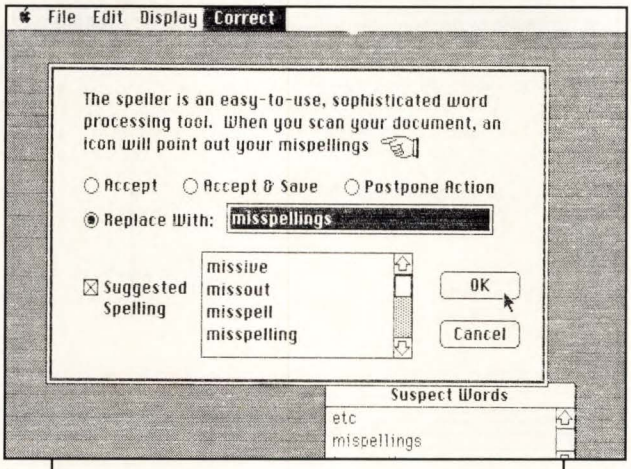

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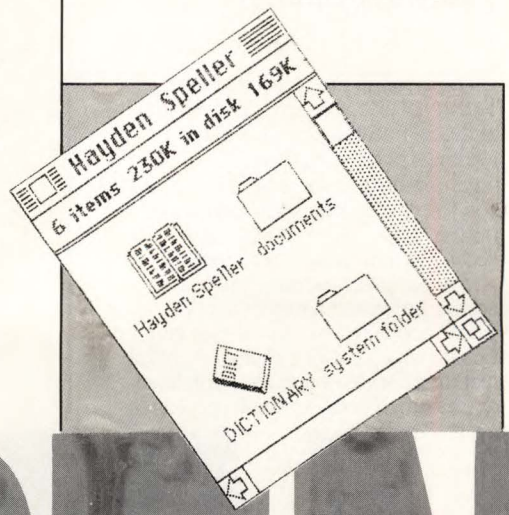

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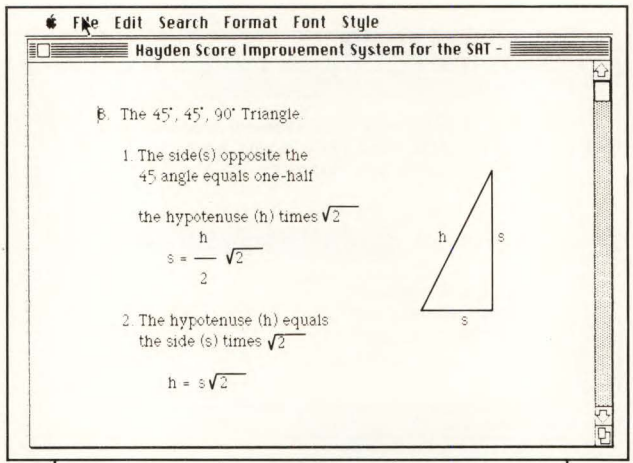

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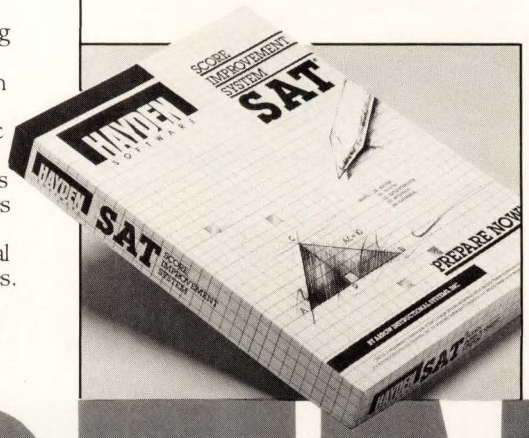

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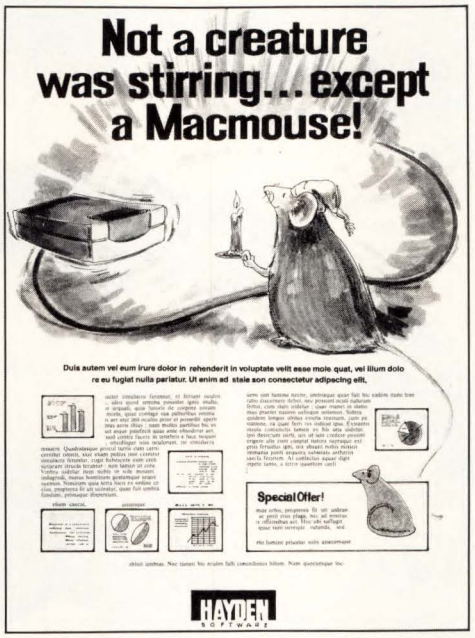

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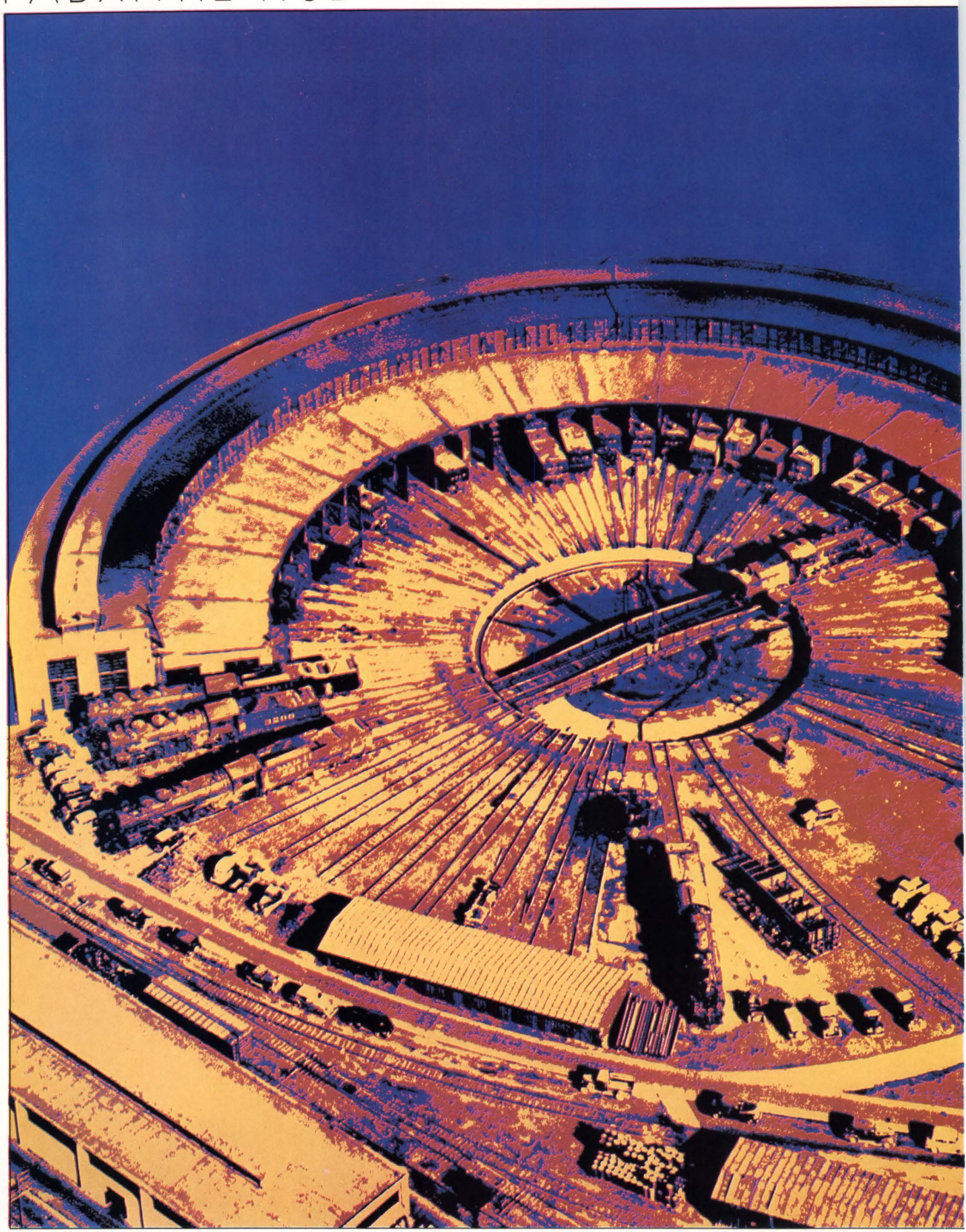
PABX: THE HUB



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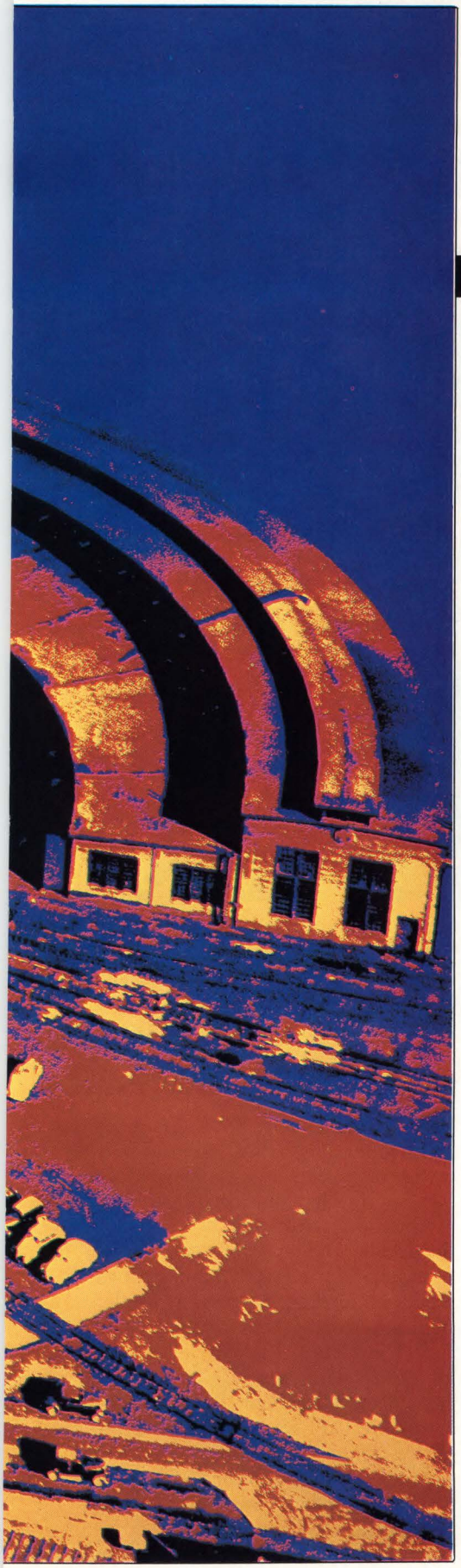


KEEPING COMMUNICATIONS ON TRACK

The PABX has become the soul of the telephone, endowing it with an array of new functions.

by Joseph Hillhouse, Assignments Editor

The least intimidating of all office equipment, the telephone has long been taken for granted by its business users. But this 108-year old device is no longer the simple vehicle for communications it once was; it's on a quick march toward amazing versatility and mind-boggling complexity. For the computer has become the new soul of this old technology in the form of the PABX, or private automatic branch exchange.

The PABX's daunting amalgam of microcircuits and software, nodes and interfaces transmits data, facsimile, even video at high speed. These, as well as voice, travel over miles of twisted-pair wires that snake through office complexes.

On the most basic level, of course, the PABX operates as a relatively simple switching device for voice communications. It sets up calls within a private network and connects to the public telephone circuits provided by the local telephone company and long-distance carriers.

From this simple beginning, however, the PABX has developed into a wide variety of products supporting communications networks of all shapes and sizes. The selection of PABXs ranges from the small wall-mounted Siemens SD-80, which handles from 16 to 80 telephone lines, to Northern Telecom's giant SL-100, which peaks at 30,000 lines.

PABXs are also found in all kinds of network setups. A telephone system can be built around a single, stand-alone PABX, for instance, or embrace a series of switches, large and small, in a unified private network—like the Electronic Tandem Network from AT&T—spanning thousands of miles and servicing hundreds of locations.

PABXs also come in several generations—but no two experts agree on how many. If analog PABXs are included in the count, there are at least three or four; if digital only, two or three. In any case, the generational direction is from analog signaling (common to most telephone lines) to digital signaling (compatible with computers) and from voice-only communications to integrated voice and data.

Some PABXs switch only data, but these don't rate a generation yet, even though they're digital. Moreover, some experts think data-only PABXs are doomed to occupy whatever tiny role they can play in corporate systems designed by the hard-core "segregationists" in data processing.

The application of computer technology to communications has been the force behind the recent evolution of the PABX, and has brought about countless innovations and improvements. The power of mini-

PABX: THE HUB

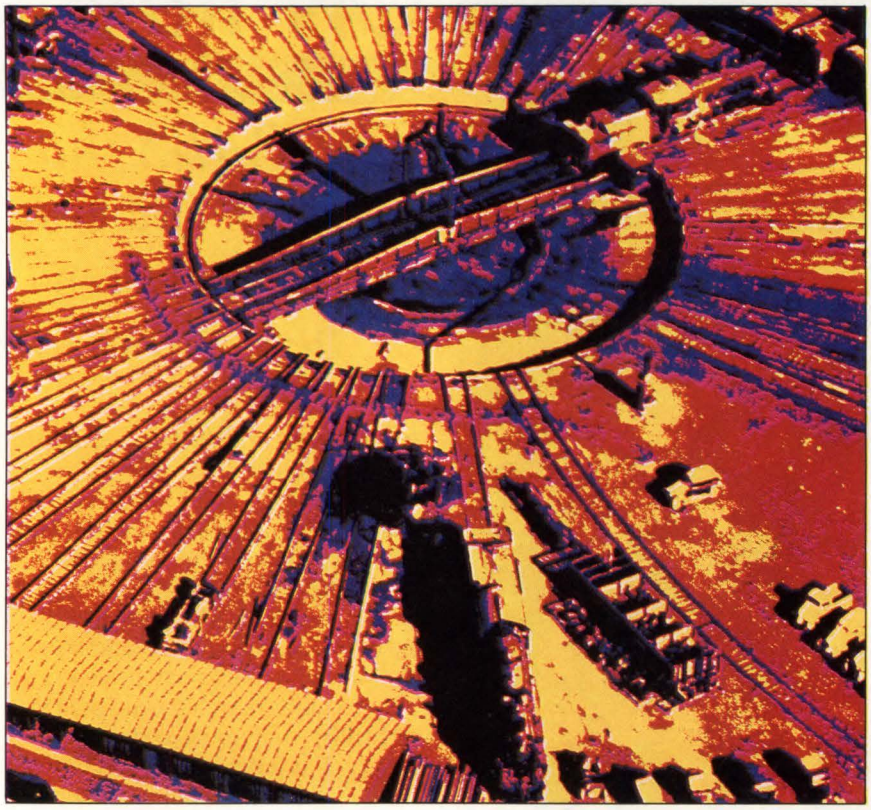
computers and microprocessors has, for example, made possible common digital PABXs that offer such sophisticated features as integrated diagnostics—the ability to detect, isolate, and, in some cases, automatically correct faults in the system. In more advanced models, intelligence has actually been distributed throughout the system, instead of residing entirely at the switching hub. This extends the system's range, reducing the likelihood of system-wide failure and relieving the central processing unit of many lower-level functions.

Of equal importance to some users is the option of acquiring processing power in increments. This has encouraged the trend toward modular PABXs and systems that can readily be expanded and upgraded. With a modular switch, management theoretically should be able to call for fine-tuning of system growth, and, perhaps, even postpone obsolescence. James H. Morgan, a consultant in Morristown, NJ, suggests that these characteristics make it easier for the buyer to be frugal now without sacrificing for the future.

"I advise my clients to go with a manufacturer that offers the potential for 'all of the above' as a hedge against the future," Morgan says. "The big advantage of a modular switch is that you don't have to pay for a lot of expensive features before you're ready to use them. You can add them later, as needed."

For the telecommunications or information-systems manager, however, progress still poses difficult, sometimes unavoidable, choices about when and what to buy. Should a company take the leap to digital, or stick with analog? Is it ready to integrate voice and data? Does it really need voice mail or electronic mail? How much can it afford to spend or *risk* on state-of-the-art features?

Emphasizing the importance of rigorous cost-benefit analyses, Richard A. Kuehn, president of RAK Associates of Cleveland, is among those



consultants who worry out loud about the temptations of high technology. The author of *How to Buy a Telephone System* (The Telecom Library Inc., New York), he advises against jumping at the PABX that's touted as being ahead of its time.

"Some companies are buying for future needs they are unsure they'll have," Kuehn says. "You have to look at the possibilities and the dollar exposure, and ask yourself, 'Will I use a particular feature within the life of the system?'"

With technology always racing ahead, the difficulty of keeping up has been compounded by upheaval in the telecommunications industry. The boom in competition ignited in 1980, when the Federal Communications Commission moved to deregulate telephone-switching and terminal equipment, has escalated to an explosion following AT&T's divestiture of the Bell operating companies. Network managers find themselves deprived of Ma Bell's support and comfort, surrounded by strangers more than eager to help them—for a price.

The PABX market was once so utterly dominated by AT&T that it might have been fairly described as being one-dimensional, if AT&T hadn't produced more than one model of its Dimension PABX. Now the field is wide open, with a host of new offerings pouring in from foreign and domestic suppliers. In fact, by the end of the decade, the United States will be a net importer of telecommunications products, according to a study by the Big Eight firm of Arthur Andersen & Co. (New York). The trend is well underway, with Japanese imports increasing to 60 percent last year, according to U.S. Department of Commerce figures, and NEC Corp., the Japanese communications and computer giant, moving to capture 10 percent of the U.S. market.

At the same time, the nature of the

competition is changing in a way that at least one professional observer thinks may have a greater impact on PABX users than even divestiture has had. Most of the major computer and office-system manufacturers, keenly aware of the PABX's promising future in office automation, have begun to move in. IBM's stake in Rolm Corp., Lowell, MA-based Wang Laboratories' in Intecom, and Minneapolis-based Honeywell's joint venture with Ericsson mark the beginning of the end of the era when PABX systems were purchased independently from larger office-systems products, according to a report by Probe Research, a consultancy in Morristown, NJ. "The PABX industry is merging rapidly into the larger office-systems market, and by the end of the decade will no longer be distinguishable," the report says.

Although the PABX vendors are in a hurry to position themselves in office automation, their customers have needs other than the "office of the future" on their minds. Another study, by Venture Development Corp., a management consultancy in Wellesley, MA, found that most buyers of digital PABXs were less interested in data features than in "improved voice services such as least-cost routing, speed calling, call restriction, direct dialing, etc. Data capability is desired in case it may be required within the expected lifetime of the PABX," the study concludes, but it's not a factor in deciding whether or not to buy a PABX."

In other words, the PABX is a device for traditional telephoning, and there are literally hundreds of features—from automatic redial to sophisticated call-accounting functions like station-message-detail recording—to make plain old telephone service more versatile and cost-effective.

"Most of these features are really not just for convenience," says George J. Hendry, a consultant in Chicago. "It depends on the environment, of course, but in a bullpen situation, for instance, call pickup is not a convenience; it's a necessity. Speed calling can be a real time-saver for someone who does a lot of calling. And it really doesn't cost anything extra to have most of these features."

The growing emphasis on self-reliance in the management of telecommunications is reflected in the general enthusiasm for PABX options that promote more productive, flexible, and economical use of the company phone system. These are features that let management get the most out of employees and financial and technical resources.

To produce substantial direct savings, for instance, companies routinely outfit their PABXs with least-cost routing, an option that has become almost indispensable in this era of competitive long-distance service. Least-cost routing attacks the long-distance phone bill by automatically identifying the least expensive service for an outgoing call, taking into account the destination, time of day, and circuits available.

Other options, like automatic call distribution, are designed primarily to increase employee productivity. In the case of automatic call distribution, sequences of varying degrees of sophistication balance the load of incoming calls among sales representatives. Still other features make the telephone system more flexible. Today, it's possible to relocate phone handsets within the corporation without changing their numbers—or calling in the vendor's service organization—and to control the assignment of trunking capacity among various groups of users.

After 108 years, the telephone is too young to die because it is not too old to change.

But control over the allocation of resources has gone well beyond circuits and handsets. The technology of the most sophisticated digital PABXs has been refined to the point of being able to assign bandwidth, or raw transmission capacity, automatically, on demand, and from instant to instant. Dynamically allocated bandwidth, as this option is called, has few immediate applications but lots of potential. In some of the more powerful PABXs, like the Rolm CBX II, the ability to deliver bandwidth far exceeds what is needed for voice, data, or even full-motion video. The CBX II allocates bandwidth in chunks of from 2,400 bits per second to 74 million bits, or 74 megabits (Mbps), per second. It switches data at a top speed of 64 kilobits per second (Kbps) and requires bandwidth only in the low-megabit range to carry video.

Most of the bandwidth of the CBX II has, in fact, been provided for the future, says Ron Raffensperger, CBX II program manager. "We don't have the products that require this much bandwidth yet," he says. "But when we figure out what we want to do with that capacity, all we have to do is build the interface cards and it can be done."

There are, however, PABXs that are giving dynamically allocated bandwidth a workout at transfer rates above 1 megabit. These include Intecom's Integrated Business Exchange (IBX) and PABXs made by some of the other manufacturers like CSX, that claim fourth-generation status for their products.

The demand for high bandwidth in each case has been created by the integration of a specialized, high-speed local-area network (LAN) into the PABX. Of course, any modern telephone system, including some with more advanced analog switches, can be used for local-area networking. But Intecom's Lanmark and the other integrated LANs em-

ploy high-speed internal packet-switching, as opposed to the usual telephone-circuit switching, to transfer data between nodes in the network. Intecom, which is alone in having any real track record with this technology, says its LAN can achieve "burst mode" speeds of 10 Mbps over standard twisted-pair telephone wire, eliminating the need to install expensive coaxial cable.

"It's virtual Ethernet, but better," says Frank Miller, product-support manager for Intecom, referring to the well-known LAN developed by Xerox Corp. (Stamford, CT). Miller bases his claim on the elimination of coaxial cable and transceivers (or transmitter-receivers), the IBX's nonblocking architecture (every device has a pathway), and its superior range, up to 10 miles between nodes.

Whether the time has come to entrust most, or all, of organizations' information resources to a single communications controller remains undecided. But there are companies beginning to move, albeit cautiously, in that direction. This year, McGraw-Hill, the New York-based publishing giant, began testing the data-switching capabilities of the IBX in its corporate headquarters. From quite modest beginnings—fewer than 20 terminals at midsummer, with most data transmitted at 9.6 Kbps—the publisher hopes to fashion, eventually, a flexible, all-digital fully integrated voice-and-data network. It is even considering the possibility of switching over about 500 terminals now supported by coaxial cabling to the IBX.

"This is going to be our local-area network," says Patrick Hennelly, manager of operations in McGraw-Hill's telecommunications department. "We're shooting to have close to 1,000 terminals on the system, and we have a fair number of personal computers that are also strong candidates for inclusion."

The PABX doesn't have to handle everything to win a place in the office of the future. The point is that it *can* handle almost anything while exploiting the reach and flexibility of standard telephone wire that coaxial cable can't match. Those companies with tightly defined goals for data-switching haven't necessarily passed up the chance to wring some extra value out of the telephone system.

Switching data with a PABX offers two advantages: the switch's ability to establish on demand a circuit between any two devices, and the user's ability to locate a device anywhere on the telephone system. Both are intrinsic to PABX technology and can be exploited to solve specific problems, even if the organization hasn't made a full-blown commitment to integrating voice and data.

For instance, the organization might turn to the PABX to discourage "terminal farming," the accumulation by employees of more than one dedicated terminal, or to combat the high cost of "churn," the impact of constant moves and changes on a network. These are the challenges for which the PABX is ideally suited, says John E. Dulfer, a consultant and president of Telecommunications Planning in Melbourne Beach, FL.

"Terminal or personal-computer users who communicate with more than one corporate host or outside database don't need permanent, hard-wired connections," Dulfer says. "And if terminals are being moved around a lot, users can unplug them and replug them without having to rewire. Most businesses are either growing or going out of business. If they're growing, they're moving people around, and they need the flexibility to make moves and changes quickly."

A case in point is provided by George Hendry, the consultant, who has been working with a Chicago-area client to extend data communications throughout an expanded corporate complex. Instead of laying coaxial cable to all corners, the company, which will remain unidentified, is using its new Northern Telecom SL-1 telephone system to conquer space. Hendry says the arrangement is especially cost-effective for servicing isolated or frequently moved terminals. Not that it isn't expensive to add data-switching capability—up to $400 per line with the SL-1, according to Northern Telecom—but the alternative would have been far worse over the long run, Hendry says. "It's expensive [to add data to the telephone system] the first time," Hendry says, "but it's not cheap to install 1,000 feet of cable, either, and it gets a lot more expensive if you're cabling all the time."

Among its other virtues, the digital PABX may be unsurpassed as a tool for pulling together different technologies and approaches into a coherent networking scheme. It not only functions as a multipurpose switch, but as a multipurpose interface as well. The PABX has always served as an interface between private and public telephone systems. Now that capability has been expanded to create new opportunities and efficiencies.

The range of options begins with relatively simple features, such as modem-pooling, which allows a large number of terminals to share a small number of modems for analog-to-digital and digital-to-analog conversions. Some of the other, more ex-

The value of many convenience features has been obscured by hard-to-use coding systems and inadequate user training.

citing, possibilities include LAN gateways for passing information between separate local-area networks; packet-switching interfaces (based on the X.25 protocol) for connections to private packet-switched networks and value-added data carriers, like GTE Telenet, Tymnet, and RCA Cylix Communications; and T-1 interfaces (based on T-1 standard of 1.544 Mbps, or 24 channels of up to 64 Kbps each) for high-speed digital transmission between terminals and computers or over long distances.

Because a telephone system is an essentially neutral, or "transparent," medium, impartial to variations in code or protocol when equipped with software-driven protocol converters, it is a convenient means of integrating different proprietary data technologies. Hendry's client, for instance, uses the SL-1 as a bridge between IBM and Wang computer systems. And it has become routine for PABXs to support standard ASCII terminals instead of more expensive IBM online terminals in IBM 3270 environments.

To the office worker, of course, progress in telecommunications is revealed right on the desktop, through advances in terminal equipment that add to the utility or improve the performance of the telephone system. The transition from plain old telephone to workstations that perform many chores is likely to be a gradual one, but even in the short run, the changes can be dramatic.

The first step might be the installation of digital handsets that give users one-button access to the features they use most often. Without adding any new features, corporations can increase the usefulness of the system by making it easier for employees to take advantage of the existing ones. Moreover, in some cases the handsets themselves bring to the desktop the ability to integrate voice and data. Rolm's Rolmphone and NEC's Dterm telephones, for instance, are among those equipped with standard RS-232C interfaces for connecting data terminals

How much can you afford to risk on state-of-the-art features?

directly to the phone system. The handsets of some other manufacturers—Northern Telecom, for instance—may provide the same interface through a separate but attachable data module.

Eventually, this pairing of data terminals and handsets may give way to the mass availability of relatively inexpensive, integrated voice-data terminals that will surely follow in the wake of such products as AT&T's line of Business Communication Terminals and the Rolm Cypress terminal. In the meantime, however, two devices can still be better than one. Not only is it possible to send data at maximum speeds in the range of 56 Kbps to 64 Kbps directly through the telephone, but also to send data using many of the same software features developed for voice communications—like call forwarding, speed dialing, and even least-cost routing.

After 108 years, the telephone is still too young to die because it's not too old to change. Now even the traditional limitations imposed by time are succumbing to technology. It no longer takes two—not two at once, anyway—to talk over the telephone. New voice- and text-messaging systems are transforming the old all-parties-present medium into one that can send messages at any time, to practically any number of people no matter where they are at the moment.

Voice- and text-mail systems, which operate as stand-alone units or as functions of the PABX, have in common the ability to store written or spoken information on disks and to forward it. The combination of store and forward functions makes it possible to send and receive messages in several ways. Voice mail, for instance, in its most familiar role works like a telephone-answering machine, but it has other uses, such as generating internal messages for immediate or delayed transmission. These messages can be sent to individuals or broadcast to large groups, and can be used reliably to overcome differences in work schedules and even time zones, as long as the party on the other end is equipped with voice mail, too. Text-based messaging offers options analogous to voice mail, although some systems may rely on simple, ready-made messages, while others provide full-blown electronic mail.

To the extent that they are competitive technologies, voice and electronic mail both bring certain disadvantages. It takes a terminal and the ability to type to use electronic mail; it takes more poise than some executives can summon on a moment's notice to compose a statement to a recording device. It's not surprising, therefore, to find PABX manufacturers developing both. NEC, for instance, is planning to introduce separate modules for voice, text, and facsimile mail before the end of this year. New competitors and products will surely follow, according to Jeffrey Matros of Probe Research, as the industry rushes to make up for lost time and opportunities.

"It has been quite evident that the many varieties of messaging required in business communications have thus far been poorly served by the PABX industry," Matros writes in his report for Probe. "This oversight will change dramatically over the near term as PABX manufacturers scramble to add extensive messaging functions to their terminal instruments and applications processors."

At the same time, acceptance of voice and electronic mail may progress slowly if the technologies are believed to pay off only in indirect productivity gains. Potential customers may be more interested in direct savings than in ending "telephone tag." And it probably helps if a vendor

PABX: THE HUB

has a few success stories in its sales arsenal. Rolm's voice-mail system, Phonemail, for instance, has made a believer out of Keith McCoy, traffic director of Contract Freighters Inc., Joplin, MO, by making a difference on the bottom line.

When CFI, a national trucking carrier, decided to install a Rolm CBX II earlier this year, the trucker also bought the Phonemail option, hoping to reduce the steep 800-number (in-bound WATS) bills generated by the constant exchange of messages between about 450 drivers and the home office's dispatchers. Today, drivers no longer have to spend half a minute on hold waiting for a 15-second message, McCoy says, because routine operating instructions are left in their voice mailboxes. With business up a whopping 81 percent from last year and the volume of in-bound WATS calls more than doubled, costs have increased some but not significantly, he says.

As for winning over all those truckers, CFI did it the old-fashioned way, according to McCoy. It bribed them. Because the drivers' cooperation was essential to the success of the new dispatching system, the company encouraged them to use their voice mailboxes to communicate with families and friends, as well as with the dispatchers. "It took a bribe to get them into the swing of things," McCoy says, "but it worked out really well."

Not every adventure in telecommunications has such a happy ending. Nor is there any guarantee that emphasizing performance at the expense of price will produce a dependable phone system. In fact, some consultants, like Richard Kuehn, suggest that shopping for advanced features is the wrong way to go about buying a PABX. Kuehn asserts that 95 percent of the bells and whistles are, at this point, better for the seller than for most buyers. "In most situations," Kuehn says, "one PABX is very similar to the next. The vendors are trying to differentiate themselves by the number of features and announcements, but they don't make one better than another. I've had a telecommunications manager say to me, 'We're supposed to have the best telephone system possible, so why don't we get dial tone?'"

Some experts, of course, are more enthusiastic about the march of technology than others, and the differences in their outlooks can cut across a number of issues. Several of these issues grow directly out of the emphasis that has been placed on integrating voice and data: Should organizations spend more now to get the option of switching data in the future? Does a commitment to transmit more than incidental data over the telephone system carry with it a risk of degraded voice communications? To what extent should the organization commit its information resources to any single system?

Different consultants also have different opinions about the urgency of moving from analog to digital technology. For instance, Charles H. Gibson of International Project Management in Clydon, MD, says the choice between an analog and digital PABX should take into account the size, sophistication, and even location of the buyer, not to mention relative cost.

"Everything is a matter of return on investment," Gibson says. "You try to get back $2 for every $1 invested, and it's not easy because the phone system doesn't show a profit, but it's definitely an expense."

On the other hand, James Morgan says he would probably refer a client that insisted on an analog PABX to another consultant, for two reasons: There are consultants who are better versed in analog technology, and the client would probably be wrong to want it.

"If a system is small—50 lines or less—and there is a significant difference in cost, an analog switch might be the right choice," Morgan concedes. "But I don't see any advantage otherwise. Virtually all users will end up needing digital over the lifetime of their PABXs."

Even the absolute sanctity of dial tone, that *sine qua non* of telecommunications, is open to debate. Despite all the emphasis today on systems that are "totally nonblocking," or designed to provide a circuit for every possible station-to-station and station-to-trunk connection, Kuehn argues that such systems often represent an abdication of responsibility for traffic engineering. In the first place, he contends in his book, easy recourse to nonblocking design can be wasteful, and he cites the example of one system advertised as nonblocking that can support 50 percent more stations, based on conventional traffic levels. Moreover, he says, "busy hour" traffic levels are still important because of limits on the number of transactions that can be processed by the PABX's central processing unit.

On what points do the experts agree? There's an overwhelming consensus on the importance of buying from a vendor with a record for service and support. And although they may disagree about particulars and priorities, most—if not all—consultants and network managers would put the business needs of their organization ahead of other considerations. "A telephone system should be designed for the client's business," Charles Gibson says. "It should meet the needs of the business, rather than adapt the business to itself." □

The PABX has developed into a wide variety of products supporting networks of all shapes and sizes.

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CIRCLE 17

AN OLD TECHNOLOGY TAKES ON A NEW SHINE

Speedier transmissions and improved reproduction may secure fax a place of importance in your telecommunications plans.

by Dawn Sova

Remember facsimile? In the highly automated office, that old document-transmission method can seem almost an anachronism. If you've not used fax lately, the term probably brings to mind a device that took six minutes or more to send a single-page document. And you probably remember that the silver-gray electrosensitive paper used by fax machines gave off an odor of ammonia.

Fax may seem to be old hat, but it's time to take another look at it. This technology has matured since the old days. According to Kenneth G. Bosomworth, president of International Resource Development (IRD), a Norwalk, CT market-research organization, "We're entering The Golden Age of Facsimile." Competitive pricing, faster transmissions, and improved copy quality are just some of the factors fueling fax's comeback. Another—perhaps the most important—is IBM's move toward integrated office-automation networks in which fax plays a vital role.

The appeal of fax is that it's fast, accurate, and cost-efficient. A typical machine consists of a photocopier equipped with a scanner. The device scans a document, converts the images to electronic impulses, and sends them across the telephone lines to a remote fax that converts the impulses back to hard copy.

The advantages of this technology are obvious. Unlike its main rival, electronic mail, which can send only messages that have been keyed into a computer terminal, facsimile can send duplicates of both alphanumerics and graphics. This means that signatures duplicated via fax are legally binding. And because rekeyboarding of documents is unnecessary, fax also saves operator time.

Fax equipment is both reliable and durable. The mean time between failures has been estimated in the 3,000-hour range. Considering that a business sending out an average of 225 pages monthly will only accrue four hours of usage, reliability is indeed a strong point.

For some organizations, fax is actually preferred over electronic mail. Ernest Ferrini, manager of data and voice traffic systems for TRW Systems in El Segundo, CA, believes his company's 150-unit fax network is faster, more flexible, and easier to use than electronic mail. (The network includes equipment made by Burroughs, Panafax, Pitney Bowes, and Rapicom.) "Fax can transmit anything—photographs, handwritten

Photo by Bob Ward

FAX UPDATE

Photo by Tom Sobolik

Facsimile, a document-transmission method that has been lost in the shadow of electronic mail, is about to enter its golden age, predicts Kenneth Bosomworth of International Resource Development, a research firm.

documents, typed memos. We transmit a lot of circuit drawings, and fax guarantees they get anywhere in less than a minute. Electronic mail can't promise that. Fax is flexible, too; you don't have to retype documents into a computer to transmit them."

Ferrini also finds it easier to train users on fax than on the personal computers used for electronic mail. "The Control Message Center, where most of our units are located, offers a brief, 10-minute orientation," he says. "At our remote sites, however, there's only a simple poster placed above the fax, listing six steps, which start with 'Turn on the machine.'"

James Messina, vice president of data services for Lone Star Industries, one of the nation's largest producers of cement, concrete, sand and gravel, crushed stone, and precast concrete products, also prefers fax. The Greenwich, CT, corporation uses 41 Panafax MV 3000 units for both inter- and intraoffice transmissions. "Electronic mail can't compete with fax," he says. "Fax means that legally binding copies of documents can be sent to regional offices without the delay of Express Mail or private couriers—and we retain the original.

"The personal computer doesn't stand up to fax in terms of document transmission," continues Messina. "Not only is it more expensive, but it's slower. For example, right now I'm going over three pages of disputed bills that were sent by fax from our Dallas office. Without fax, getting them might have taken two or three days. With fax, it took less than a minute. And electronic mail can't send the signatures, handwritten documents, and graphics that fax can. When you're communicating with five regional offices, these are important considerations."

Speed, flexibility, ease of use—these are the benefits emphasized by fax's promoters. But not all corporations are about to toss in their electronic-mail systems in favor of facsimile. In fact, a large body of experts considers electronic mail the superior technology, and for the very same reasons—speed, flexibility, and ease of use.

Theresa Iadarola, manager of Easy Mail for Citibank, the nation's largest bank, says she uses an electronic-mail system developed by Interactive Systems Inc. (West Caldwell, NJ), because it does what she expects electronic mail to do: "It gets the work out fast." A dumb terminal with dialup capabilities and a phone let Citibank managers transfer documents via a local telephone call to any Citibank branch in the world. The bank has also established a link with the electronic-mail system operated by MCI Communications, Washington, to communicate with clients, businesses, attorneys, and other parties outside of Citibank.

The inability of electronic mail to handle graphics and signatures is of no concern to Iadarola, who points out: "The purpose of our system is speed. It was not designed to do spreadsheets or transfer graphics."

Steven Weissman, an analyst at IRD, believes fax has serious disadvantages. "It all boils down to utility, a function of economy. Fax will never replace electronic mail because, first, fax machines are still relatively expensive; second, they require a lot of document-handling (typing, filing, etc.), which is also expensive; and, finally, they can't be integrated.

"Electronic mail may have its problems," continues Weissman, "but at least it's more versatile than fax. You can link personal computer to personal computer or to a number of electronic-mail systems, such as Easy Mail, Western Union, and MCI. Besides, most businesses need to send letters rather than graphs, circuit drawings, or photographs; they need personal computers, but they don't necessarily need fax."

Fax vs. electronic mail—the argument over which transmission method is more suitable to business is multifaceted. Harry Newton, telecommunications expert and publisher of *Teleconnect* magazine, asserts that "fax will survive and thrive" because its rival is not user-friendly. "Electronic mail is a pain in the butt; you always end up inserting a false command and boxing yourself into a corner. Also, it takes at least six months to learn to use the personal computer well, but fax can be learned easily."

Stanley Greenfield, compiler of *The Facsimile Users' Directory*, which he plans to publish early next year, adds that fax eliminates time spent rekeyboarding, operating equipment, and checking for errors. "With a 10-page document, fax beats electronic mail hands down. Electronic mail may move faster over the wires, but it costs more to operate. And unless the paperless office becomes a reality soon—with all documents machine-readable and stored on disk—keyboarding will continue to

consume a lot of time for those who use electronic mail."

The paperless office may be a long way off, but the trend to reduce paperwork is already under way. And that, according to some telecommunications experts, threatens the success of fax. Ron Frank, managing director of the Frank Communications Group in Mount Vernon, NH, says: "There are many reasons why a business should not get into the paper format, except to handle a small percentage of documents that are of archival value. Most businesses are cutting down on paper transmission. And any business looking for an alternative to paper will avoid fax."

The experts may never agree on which is the superior technology. In the meantime, what do you use to send your documents? For now, fax is most suitable for organizations that do a lot of paper-pushing and send a lot of diagrams, charts, pictures, signatures, or other images that can't be easily transmitted via computer terminal.

If you are considering fax, you should weigh a number of options first. Among those options are the overnight mail services. Bob Dye, director of planning and analysis for communications at Zale Corp., offers the following advice: "You have to weigh the urgency of your needs. If mail suffices, then fax becomes only a luxury. Ask yourself: 'How soon do we need most documents? What are our mail costs?' For us, fax is critical. For other companies, it may not be."

Messina of Lone Star also offers some guidelines: "If you move only one document a day or 10 a week, then Federal Express or overnight mail will suffice. But if you send, say, 10 documents a day, a fax machine will probably save you in a year the amount you're spending on overnight services."

If you need fax only infrequently, it might be more economical to use one of the several facsimile-transmission services, which include RCA Global Communications (Q-Fax), Syndifax, Western Union (International Facsimile), and Federal Express' Zap Mail. Fees vary, but two-hour delivery from the door of the service to the recipient averages $35 for the first five pages and $1 for every page following. (Transmission on your own equipment costs between 35 cents and $1.80 per page.) Lower fees are charged when an employee takes the document to the service office. Your document is transmitted to the service office nearest your recipient, which receives a hand-delivered copy. When deciding between purchasing equipment and using such a service, economy must be weighed against convenience.

Should you decide to venture into fax, careful analysis of the various vendors and their wares can help your investment pay off. Buying the wrong equipment cost Zale Corp. considerable time and money. Says Dye, "Our first equipment was made by Qwip, and it didn't work very well. We kept losing transmissions and the copy quality was very poor."

Two years ago, the Dallas-based jewelry retailer, which owns Wiss-Lambert, Zale, and Mission jewelry stores, switched to desk-top fax machines from 3M Corp. to eliminate those problems. "We have 1,150 EMT 9140s and about 50 EMT 9160s—all desk-tops to save precious office space," says Dye. "About 40 percent of our fax traffic is credit-application approval and the rest is intracompany message broadcast, data collection, sales flashes, and everyday business correspondence."

With the right equipment, Zale's system runs smoothly, so despite the initial problems, Dye still swears by fax. "Speed is a prime requirement for Zale because ours is an impulse-purchase business. Once a customer has decided to buy an item, we want to get account authorization as quickly as possible so we don't lose a sale. Before fax, we were wasting phone time. There were transposition errors, differences between what was said on one end and what was heard at the other end, and low operator productivity. Fax changed that."

Fax units fall into four different categories, or groups, which are defined by standards developed by the International Telephone and Telegraph Committee (CCITT). Before buying a machine, you should know which category it belongs to and which group or groups it's compatible with.

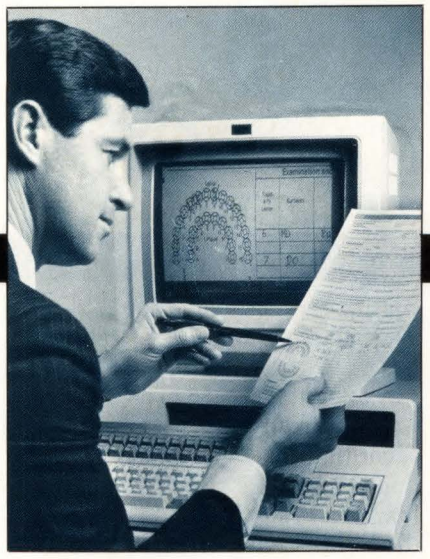
Group 1 takes in the oldest machines—analog units that transmit at a rate of four to six minutes per page. Group 2 machines are also analog, but they transmit at a faster rate, taking two to three minutes to send a page. Group 3 machines, which are digital and transmit over standard, voice-grade telephone lines, can send a page in less than a minute. And machines in Group 4 are a special breed that transmit over digital communications lines and satellite links. These can send a page in five to 10 seconds, and some ultra-high-speed Group 4 machines can reproduce pages in half a second.

Group 4 machines promise to revolutionize fax communications by standardizing transmission speeds at less than five seconds. Nancy Edmondson, research analyst with the Gartner Group, Stamford, CT, and author of a recent

"Any business looking for an alternative to paper will avoid fax."

—Frank, consultant

FAX UPDATE



The Scanmaster I, which can transmit documents to central storage, is an important component in IBM's vision of the automated office.

report on fax, believes the popularity of Group 4 is increasing. "Group 4s offer higher resolution and quicker transmission speeds. More corporations will opt for this group, as it becomes more prevalent. Then, fax as we know it today will no longer exist."

But that day may be a long way off. Kenneth Bosomworth of IRD predicts there will be a considerable lag between the availability of Group 4 technology and full implementation. "Group 4 requires wideband transmission channels, and few users have such channels," he explains. Also, compatibility between the various groups is lacking, despite vendor claims to the contrary. Fax manufacturers have adopted the international standards that permit Group 3 equipment to communicate with slower-speed Group 1 and Group 2 machines, as well as with other manufacturers' Group 3 equipment. However, as Edmondson points out: "A lot of fax manufacturers still don't follow the standards, and machines from different manufacturers are not always compatible, even within the same group."

Stanley Greenfield defends fax as being uniformly compatible. "Want to talk to a fax machine in England? Japan? You can talk to 99 percent of them. You can't come close to such compatibility linking computer terminal to computer terminal."

Yet, this 99 percent refers to Group 3 units that are compatible with other Group 3 units. Compatibility among the different groups is not a standard feature on fax machines, and this option can add $500 or more to their purchase prices.

Greenfield acknowledges that standardization among the various groups is far from adequate. Of the approximately 375,000 units currently in use, about half can talk to units from the same manufacturer and about 150,000 are compatible with those from other vendors.

Ferrini says TRW beat the compatibility problem by choosing the Pitney Bowes 8600, which constitutes about 80 percent of TRW's units. He says 75 percent of fax transmissions at TRW are to government agencies, many of which are still using older Group 1 units. "The 8600," asserts Ferrini, "is compatible with Groups 1, 2, and 3, and we've experienced no compatibility problems."

Telecommunications experts do not agree unanimously that the lack of compatibility is a major problem with fax. Bosomworth, for one, believes that compatibility and standardization are not an issue for fax's limited applications. "Fax is used mainly for intraplant transmission; therefore, the buyer of fax equipment makes sure that equipment is compatible from one site to another. For intercompany transmission, most newer fax units have a compatibility mode that can be switched on. Compatibility issues are not inhibiting."

For Ron Frank of Frank Communications, (Mont Vernon, NH) compatibility is a problem. He asserts that "fax has been its own worst enemy because of the lack of standardization." The variation among Group 3 and Group 4 makes the facsimile process muddy, and makes transmission difficult. "Compatibility is absolutely an issue!" he continues. "The failure of ITT Faxpak, a facsimile-transmission service, offers proof. The service offered big benefits for business, but tremendous difficulties in transmitting to diverse receivers has discouraged users."

One factor in particular, says Stanley Greenfield, has exacerbated this problem. "Vendors have been unable to get together and produce a comprehensive directory scheme. If a user could go to another city with such a directory and could borrow a fax machine compatible with the one he or she needs to send to, it would increase the value of the technology." (Greenfield's directory plans to offer locations, phone numbers, and compatibility data for the nation's 375,000 fax units.)

What do the experts foresee for the future of facsimile? Bosomworth expects to see fax integrated into the automated office—a trend already set in motion by IBM. He points out that fax is already only one of several ways of sending messages. "Considering that business telephone usage is an approximately $50 billion annual industry and that other means of transmission generate about $15 billion, the $400 million to $500 million fax business is just a tiny part of overall business transmission," he says.

The suggestion that stand-alone fax will yield in importance to integration with other automation is viewed by Ron Frank as predictable. "Fax is already overshadowed. There are better alternatives—electronic mail, teletext. Fax, however, will continue to play a role in teleconferencing."

Richard A. Lidstad, general manager of 3M's Business Communication Products division, disagrees. He says there will always be a need for stand-alone fax. "Of course, heavy-

"Fax has been its own worst enemy because of lack of standardization."
—Frank, consultant

volume users will continue to demand sophisticated systems that send and receive reams of documents at high transmittal speeds, but small-volume users find that the stand-alone fax matches their needs."

Bosomworth compares the future of fax to the fate of the collator. "In the past, this device was purchased separately from a copier, but today it's part of an integrated machine with both copying and collating features. Most of the collator makers have disappeared, although small ones continue to manufacture. In the same way," he continues, "ten years from now, there will still be fax manufacturers, but the mainstream products will be integrated systems."

The change, however, will be gradual. "It will be years before standards develop and users are ready to put this technology to work en masse," says Bosomworth. "During the interim, stand-alone facsimile will serve as an effective means of transmitting and receiving an increasing number of documents from nonintegrated systems."

IBM stands out in its movement to integrate fax with office-communications systems. The IBM Scanmaster I scans and digitizes document images, such as graphs, printed forms, line drawings, typed memos, and handwritten notes, and transmits them to a central computer for storage or distribution to other remote Scanmasters. IBM claims the system offers a significant savings of time and effort over conventional point-to-point facsimile transmission.

The unit operates in a communications network with other IBM office workstations, such as its low-cost word processor, the Displaywriter, to add image-handling to the text-and-data-handling capabilities. Documents can also be transmitted directly from one Scanmaster I to another over leased or switched communication lines. The Scanmaster can scan or print a page in less than a minute.

"The appeal of fax is that it's fast, accurate, and cost-efficient."

The Scanmaster I uses two software packages: the Distributed Office Support System (DISOSS) Version 3 and the Image Distribution System running on IBM 4300 or larger computers. DISOSS permits operation of the Scanmaster I with the Displaywriter, the IBM 8100 Distributed Office Support Facility, and the IBM 5520 Administrative System. The Image Distribution System enables users to send and receive image documents via the public telephone network and nonswitched voice facilities. A cover sheet is used to control routing and disposition of documents, which may be stored in the host computer and scheduled for transmission after business hours, when long-distance rates are much lower.

An optional card and cable ($1,500) and an acoustic coupler ($600)—available through IBM's Special Products Marketing division—let the Scanmaster I communicate with facsimile machines that operate under the Group 2 standard for two- and three-minute analog machines. Because the fax machines being sold today are digital—and most of those already installed are analog machines—use of the Scanmaster I outside of the integrated IBM office-communications system is severely limited. That, however, is just another example of IBM's move toward total integration.

Another trend among businesses has been toward desk-top digital units that allow for more efficient use of phone lines and improved copy quality. The features offered by manufacturers vary little, however. As Kathleen Ryan, manager of marketing support for Burroughs Corp., points out: "It's service and support and the company behind the machine that's important."

Other manufacturers of fax concur, but all fax machines are not created equal. The fax units in the vendor list at the back of this issue all claim to be compatible with all Group 3 machines. But compatibility with either Groups 1 or 2 or both is offered by only a few of the vendors. Also, the auto-dial feature, which automatically dials up remote fax machines and transmits documents at preset times, is built-in to only a few fax machines: Omnifax SF 3, Rapicom 5000, Sanyo SF 625, and 3M 965.

For the most part, auto-dial remains an option that interfaces with the following units and adds $500 or more to their cost: Panafax MV 3000; Pitney Bowes 8800, 8700, and 8900; Rapicom 3100 and 3300; 3M 9140; and Xerox 495.

What's in the future for fax? Experts may be unable to decide, but the expansion of the fax marketplace and the spread of systems throughout the world indicate that this technology may be back to stay for a while. In fact, Japan's Ministry of Posts and Telecommunications has nearly completed plans for an international facsimile system, that would link the United States, Britain, West Germany, France, Holland, Hong Kong, South Korea, and Japan. Fees have been tentatively set at between $9 and $13 per communication, and will include both cost of transmission and domestic special-delivery service.

Even though business is examining ways to eliminate paper filing and cut down on paper transmission, fax meets a crucial need in telecommunications: Not only do executives want to receive information quickly and efficiently, but they want it in document form. Fax gives it to them in writing. □

Dawn Sova is a free-lance writer based in Garfield, NJ.

Q. WHY ALL THE TALK ABOUT LOCAL AREA NETWORKS?

A. There's been a lot written about Local Area Networks (LANs). What's all the talk about? Why are LANs important? Should your company be looking into them? Is one kind of LAN better than another?

The fact is, a lot of people, ourselves included, think LANs are going to play a key role in the total telecommunications picture for most businesses. Here are some questions and answers that might help you better understand LANs.

Q. To begin with, just what exactly is a Local Area Network (LAN)?

A. It's a system for moving information between devices located on the same premises. Now that calls for some further definitions. By "information," we mean data, voice, text, graphics or image. By "devices," we mean big computers, personal computers or other workstations, printers, telephones, scanners, files, sensors and actuators, and PBXs. By "same premises," we mean office building, manufacturing plant, hospital, campus or other geographically confined area. In short, and quite simplified, a LAN is one way of connecting all these devices to each other.

Q. There seem to be a number of different kinds of LANs. Why the variety?

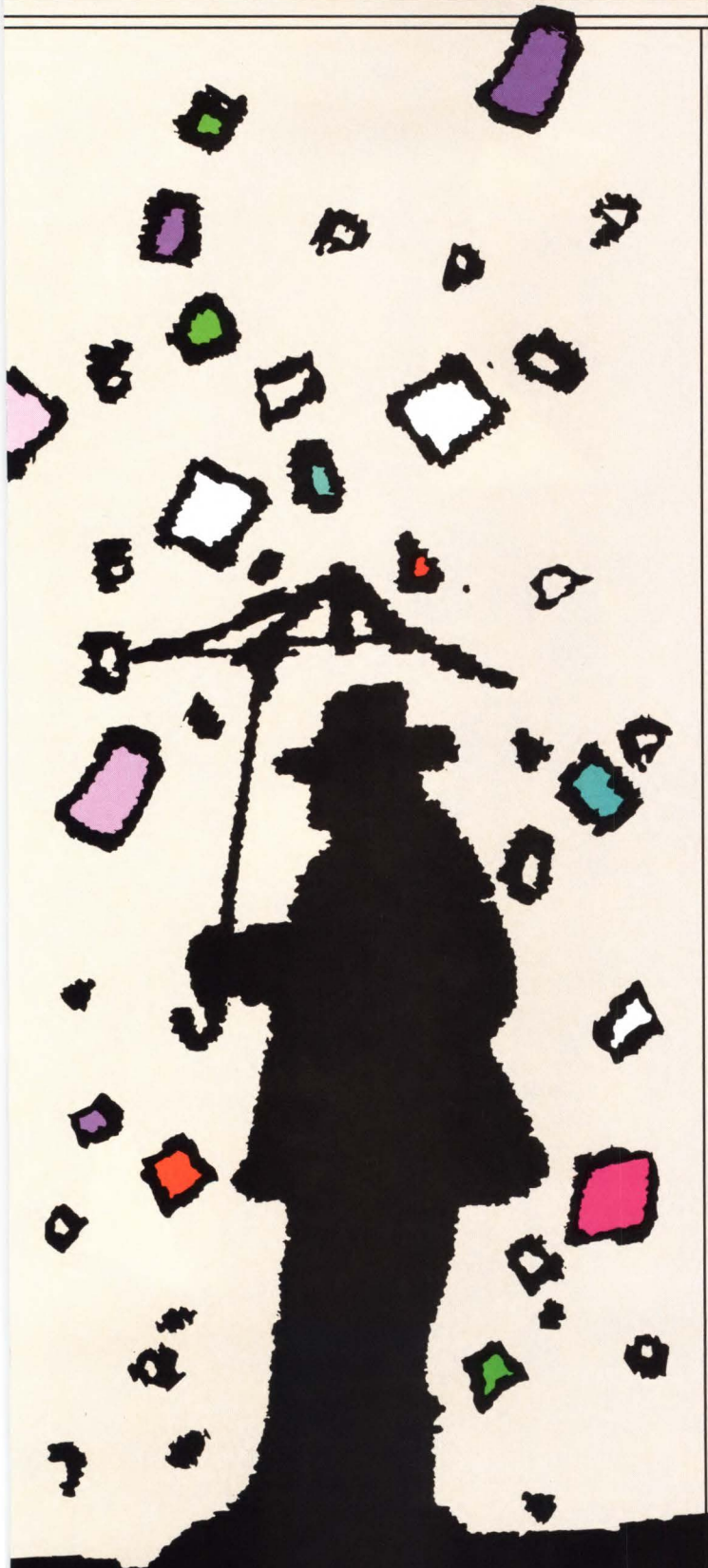
A. The reason there are different LANs is because different work situations have different needs and different cost considerations. For instance, one type of network is capable of linking different kinds of computers, workstations and other devices throughout a building or campus. This allows for the exchange of information and the sharing of resources and large data bases. Then there's a need for a network specifically designed to interconnect personal computers. There's also the need for a special "industrial" LAN to meet the unique requirements of manufacturing plants. And there may be other networks developed to meet other needs.

Q. What if I want to link all the devices in my building?

A. IBM is developing a way to get all the devices in a building to communicate with each other using established computer and communications architectures. This will allow the mainframe computers, companywide systems, smaller departmental clusters and even individual workstations to interact and share files, applications and peripherals.

We believe this general purpose LAN, utilizing "token-ring" technology, will provide the greatest flexibility and connectivity for different departments, workstations and systems. Other major benefits of this LAN technology will be very high reliability, predictability of performance, and greater overall network management capability.

The token-ring LAN will use the IBM Cabling System as its foundation. Currently being installed, the IBM Cabling System provides the immediate benefits of a common cabling solution for most IBM systems and workstations.



Q. Suppose I only need to connect personal computers?

A. We recently announced an IBM PC Network that allows a department, small company or remote location to interconnect IBM Personal Computers. This low-cost network lets PC users share files and printers, and send messages from one PC to another. The PC Network also lets users access application programs and data bases in larger IBM System/370 computers.

Q. What about a LAN for manufacturing plants?

A. We intend to offer an industrial LAN which will allow factory floor data collection and interconnection of robotic systems, machine tools, numerical processors and industrial computers.

Q. And if I wanted, could I connect these different networks to each other?

A. IBM has announced that its planned token-ring LAN will also act as a "backbone" connecting these different networks. Each network will have the ability to communicate with IBM System/370 host computers and applications.

Q. What if I'm still not sure which way to go?

A. Choosing a LAN is a business decision that will vary from company to company, and from department to department. Remember that LANs are just a portion of your company's overall telecommunications solution—a solution that should be developed in a planned, structured and manageable way. If you'd like some help in figuring out the answer that will best suit your needs today and in the future, call IBM.

There's a lot more to be said about LANs and telecommunications. If you'd like a free copy of "Positioning Local Area Networks," call 1 800 IBM-2468, Ext. 81, or return the coupon.

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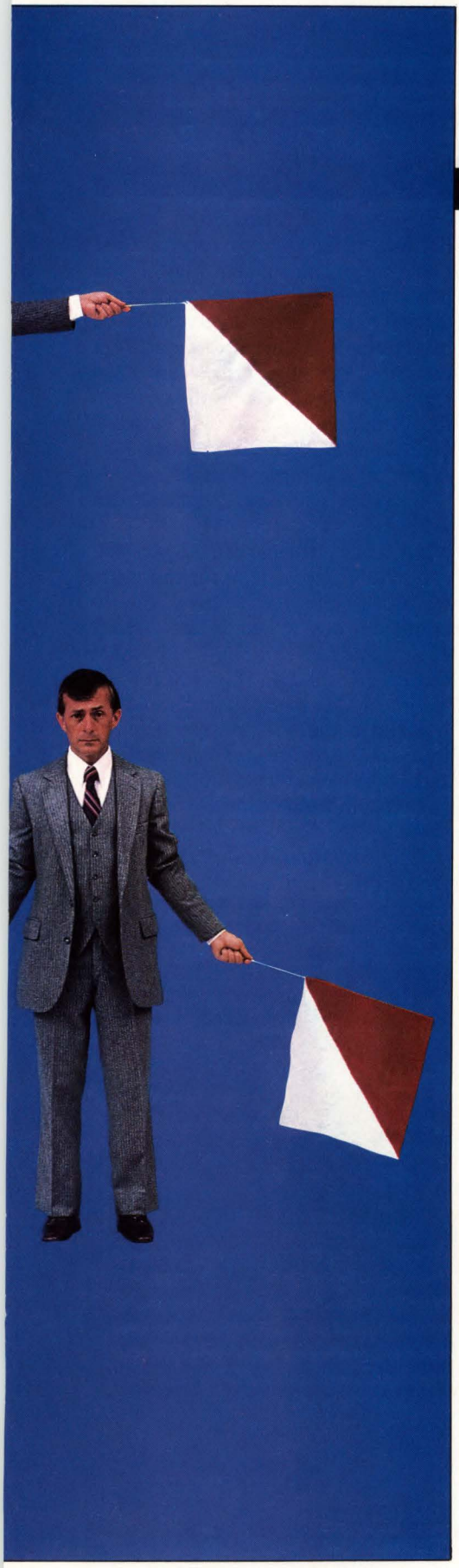

KEEP CORPORATE TEAMS ON TARGET

Managers have to dig deeper to justify the expense of computer-based text messaging, but the extra work will pay off.

by Susanna Opper

Computer-based text messaging has yet to come into the light of day. And communications managers trying to implement it must tread carefully. In fact, many proponents of electronic text messaging refused to be interviewed for this article due to "internal sensitivities" within their corporations. They feared media exposure would endanger their own messaging projects, which were still in pilot stage.

Why the secrecy? The main reason is that the technology seems to be difficult to cost-justify. But that doesn't mean these systems are without merit. Corporations are gradually beginning to scratch the surface of this 15-year-old technology to uncover gratifying rewards.

Computer-based text messaging, or computer conferencing, consists of text-based electronic meetings among managers and professionals in far-flung branches of an organization. Text-messaging software on a host computer allows users equipped with a computer terminal and modem to send topic-oriented messages through a packet-switching data-communications network.

Computer conferencing can be either real-time or asynchronous. This means that the receiver of a message doesn't have to be online when it is sent. An executive in a corporation's New York branch, for example, can send a message at 9 a.m. Eastern Standard Time to the manager of a California branch. Three hours later, at 9 a.m. Pacific Time, the California manager can read the message, print it out if desired, and send a reply, which the New York executive can read at his or her convenience. This type of conference transcends the restrictions of time and space.

Unlike electronic mail and electronic bulletin boards, electronic text messaging is usually focused on a particular problem or project and involves a specific group of participants. Like a real-world conference, participation is by invitation only—it's not an open forum for office gossip and everyday memos.

"Computer conferencing provides a forum to deal with highly ambiguous concepts—questions with no one right answer," says Roger Loeb, president of International Tele/Conferencing, Boulder, CO. "Computer conferencing has a sense of motion. When you use it, you pick up direction, velocity, emotion. Through give and take, consensus and participation, participants search for answers to difficult questions."

Text messaging may be all that and more, but try fitting Loeb's statement on the bottom line of your budget sheet. Managers have to dig deep into their corporation's budgeting practices to justify the cost of computer-based text messaging, so intangible are the benefits.

For example, one benefit of electronic text messaging is the reduction of memos and letters. The Dartnell Institute, a Chicago office-automation research house, estimates that a typical business letter costs between $10 and $15 to produce and send. This may sound like a real saving, but it

COMPUTER-BASED MESSAGING

doesn't show up on the budget sheet. Rarely does an organization track its letters and memos to determine costs. And expenses for such items are more likely to be included with the budgets for secretarial salaries, equipment rentals, and postage.

Computer conferencing shaves travel costs, claim its defenders, but that, too, is a benefit that's hard to quantify. True, unlike letters and memos, travel is a line item on most budgets, and cost savings can be directly calculated. And computer conferencing, like other forms of electronic messaging, does reduce the need for travel, which is growing more expensive daily. But corporations are understandably reluctant to replace travel with technology. Even advocates of computer-based messaging agree it's a poor substitute for face-to-face communication. No electronic handshake or online meeting of the minds can replace a look in the eye. And even if it could, some executives are too set in their ways to change. As a vice president of W.R. Grace put it: "This company isn't interested in personal computers. And we're certainly not interested in giving up travel. We have our own jets, and no one wants to stop using them."

Whether computer-based text messaging saves money is debatable, but it does save something else: frustration among managers and professionals trying to communicate between branches. And though frustration might not be in any manager's budget, it's certainly on every manager's mind.

At New York-based Exxon Corp., for example, a messaging system helps organizational-development experts do their jobs. These managers continually evaluate the organization's entire operation, reaching across divisional boundaries to improve productivity. Frequently, their interventions are urgent, for they are handling problems that may cause tempers to flare and morale to plummet. Their messaging system, Participate, from Participation Systems Inc., lets them confer and make decisions fast.

Bette Tiago, regional training coordinator of Exxon Chemicals America in Houston, recently left this note on the system: "Wow, does this system work. Two days ago, I sent out an all-points bulletin for Dick Richards [an independent consultant]. Today he called me from a remote outpost in Belgium! Someone who knew where he was saw my note. Thank you, phantom Pony Express. I not only saved time and money, but was able to take advantage of a unique set of circumstances that needed immediate action."

And at Digital Equipment Corp. (DEC), Maynard, MA, a messaging system is helping managers and professionals carve out a new technology. "DEC intends to bring quality artificial-intelligence technology to market ahead of its competitors," says Gerhard Friedrich, a manager in DEC's Intelligent Systems Technology Center in Hudson, MA. "To do that, we need to draw on skills from all over the corporation. The members of our pioneering group need to be in touch to share technical information and to get answers that won't show up in textbooks for years. Our computer conference—AI forum—is an internal marketplace for the exchange of ideas."

How much does a computer-based messaging system cost? It's almost as difficult to figure costs as it is to justify them because so many factors—from corporate philosophy to the mainframe capacity—have to be considered. Says Marty Russell of the American Productivity Center in Houston: "It costs about $125 per month, per participant, to use time-sharing computer conferencing for our programs and studies."

The cost of in-house messaging, however, can't be calculated as easily. The measurable costs of such a system are those for hardware and software—central and distributed—training, facilitation, and so on. Because most systems run on IBM mainframes and popular minis, if you have the right equipment with spare capacity, your investment could be negligible. If you need to purchase a dedicated machine, prices can range from $30,000 up. Licensing a system for in-house use can cost between $6,000 and $60,000, depending on the system and number of users.

Costs for distributed systems can vary just as widely. If your corporation has just purchased personal computers and modems for the entire executive suite, for instance, the incremental cost of computer conferencing could be zero. In fact, because conferencing is a good way to encourage executives to use their computers, it might actually help maximize the investment in micros themselves. But if the executives require training in telecommunications, your costs shoot up.

Each situation is different. Therefore, costs—and potential payoff—can only be determined through a pilot project. Set up in a small, con-

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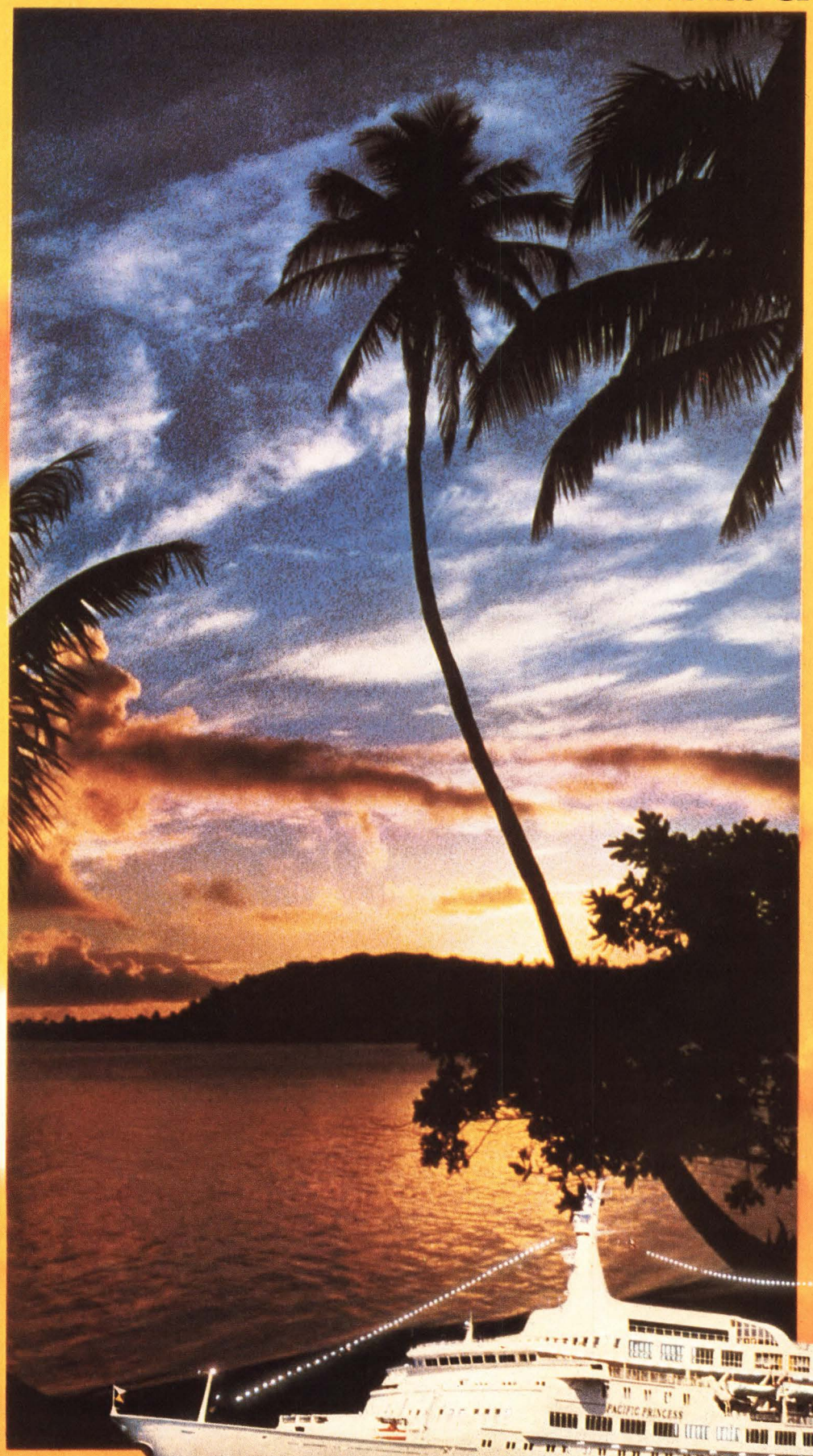

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trolled situation to address a single problem or project, a trial system can often point directly to benefits in both dollars and convenience.

A pilot project at Bechtel Corp. not only showed executives how text messaging could improve operations, but also proved that a system could pay for itself many times over.

The pilot was set up to improve the bare-bones communications system at a gold mine 70 miles from Ely, NV. There, hundreds of field workers relied on two radio phones to send and receive messages to and from Bechtel's San Francisco headquarters.

Beginning in June 1980, 15 employees on the project and in Bechtel's home office were trained on Infomedia Corp.'s Notepad system. On the dusty, hour-long jeep ride into town each night, Bechtel's project manager on the site typed the day's communications on a portable terminal. Using a motel phone, the project manager dumped his messages online, collected word from the home office, and the next day delivered messages to others at the gold mine. The system paid for itself many times over when, acting on information received from the site, a manager at headquarters halted construction of a metal floor that would have to have been replaced later at a cost of millions of dollars.

Somewhat earlier, around 1979, Lawrence de Bivort, then director of corporate development for Flow General Inc., had a different type of problem. With a mandate from the corporation's president to "do anything that worked," he was responsible for unifying a holding company with totally independent subsidiaries. To accomplish his mission, de Bivort fashioned a team of 17 managers who spanned corporate and geographic boundaries. "We needed a communications system that was fast, reliable, self-documenting, and so private that even the participants' secretaries wouldn't see the messages. We wanted to communicate asynchronously so we wouldn't get managers out of bed in Singapore or Australia when we had a hot idea at headquarters in McLean, VA."

"Electronic mail is going the way of the Pony Express."
—Loeb, consultant

A year later, de Bivort signed onto the Electronic Information Exchange System (EIES), one of the earliest conferencing systems, developed by Murray Turoff at the New Jersey Institute of Technology, Newark.

De Bivort's project was such a success that EIES—installed on an in-house network called Flownet—soon was adopted by senior management to conduct the day-to-day business of the corporation. "It became as important as any other communications tool and was taken for granted, just like the telephone, by most managers," adds de Bivort. "We used it to link technical and research-and-development teams, to create business and marketing plans, and to send out corporate news. We even tried to assemble the annual report on the system one year, but the process took too long and created too much paper."

Liz Hannon, president of Utility Data Institute, a Washington-based non-profit organization that services the utility industry, first realized the advantages of computer conferencing in the wake of the Three Mile Island incident in 1979. It turned out that another utility had coped with the same type of failure that caused the headline-grabbing event. If the findings from that incident had been relayed to the decision-makers at the Pennsylvania facility, millions if not billions of dollars might have been saved. Shortly afterward, the Nuclear Safety Analysis Center adopted the Notepad conferencing system to store and disseminate safety information and allow for synchronous conferencing during an emergency.

Working within the nuclear industry, Hannon noticed that many utilities were grappling with the same kind of communications problems. A constant parade of industry surveys took months to design, disseminate, and publish. Hannon set up a pilot project so the Center's 55 members can gather information about such concerns as coal-fired plants, air and water quality, waste disposal, and regulatory issues every day. Today, the system lets the utilities use each other instead of consultants for project research, adds Hannon. "It may cost a member company $1,500 to $2,000 a year, but a consultant would cost $3,000 to $4,000," she notes.

A successful pilot will tap the energies of innovators—managers who like to assume the role of change agent. And a successful pilot project will be led and managed by a strong leader, who is respected by his or her group. Of course, support from the top is extremely important. These systems are sensitive organisms—like families or departments. There is a kind of group consciousness that notices when the leader's attention is elsewhere or when a project isn't getting top priority. Bill Paul, senior advisor for organizational development and training at Exxon Chemical Co., who introduced computer conferencing at Exxon, is the paradigm of an ideal leader. In a typical month he may be online nearly twice as much as the next most frequent user, averaging close to an hour a day.

The leader should be intimate with computers and able to communicate effectively with the pilot group. Chris Meyer, personnel manager of Zilog, an Exxon subsidiary, advises: "It's important to have a computer-literate moderator/coach at least for the initial year of a project. This is a new technology, and without a competent champion, the other players can't get enough momentum to carry the ball."

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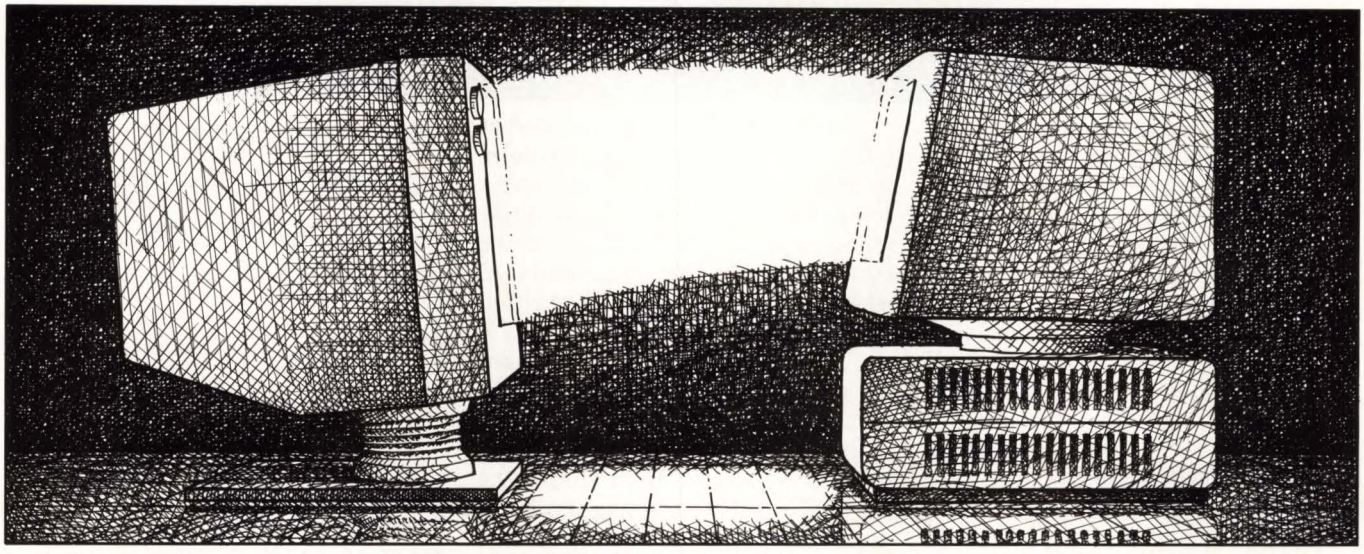

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already use computers or be willing to learn. If users sign on to the system only to find their mailboxes empty, the system will soon die from misuse. Also, hardware should be readily available. If equipment can't be in a user's office, then it should at least be down the hall or in the next office—not downstairs or across the street. If users can't get equipment—or aren't comfortable with what they have—they'll shy away from the system. "Critical mass" is a major factor in computer conferencing: When enough people won't play, there's no game.

For a computer-based text-messaging system to succeed, it must be given the best possible start. And to do that, de Bivort, who is now president of Evolutionary Services Institute, a corporate-development firm in Bethesda, MD, recommends "crafting." He explains: "Most people think hooking up the machines and teaching employees the rudiments of the system is three-quarters of the job. Actually, that's only one quarter of it. All sorts of hand-holding is needed. If, for instance, a new user loses a message or can't figure out what to do next, he or she could be scared off the system."

Crafting begins when users are introduced to a system for the first time. Generally, it takes between 15 minutes and two hours, depending on the intricacy of a system, to teach users to sign on and use computer-based text messaging. Then, a few more hours of actual use with some online, in-person, or telephone assistance usually brings users up to speed.

A new system is often launched at a full day or two of training sessions. In addition to educating users about computers, typing, and agendas, these seminars discuss the purpose of the system, define the community in which it's to be used, and offer a vision of the system's goals.

Crafting began at Exxon last January. The system's introduction was part of the company's annual planning and strategy session that brought executives together from around the world. The offsite meeting itself was designed online by a few early users of the system.

At the meeting, as executives discussed business challenges, three Apple IIe computers hummed day and night teaching participants to use their new communications tool. Meeting facilitators were as busy making sure shy users had a turn at the keyboards as they were explaining the foibles of conferencing.

Gerhard Friedrich held an all-day introductory seminar before DEC's system was even installed. He focused on cultural change instead of on training. The purpose of his first meeting was to define a user community and lay the foundation for the new technology. By observing obstacles to satisfactory communication and considering the characteristics of desirable communications, he set the stage for computer conferencing.

As part of this meeting, potential users were motivated to clear the biggest barrier to effective communication—lack of enthusiasm. Friedrich believes the extra time spent priming users was worth it: He expects to have

"No electronic handshake can replace a look in the eye."

a total of 300 participants on Participate's Version 4, sharing a DEC VAX-11/780 minicomputer running several other applications.

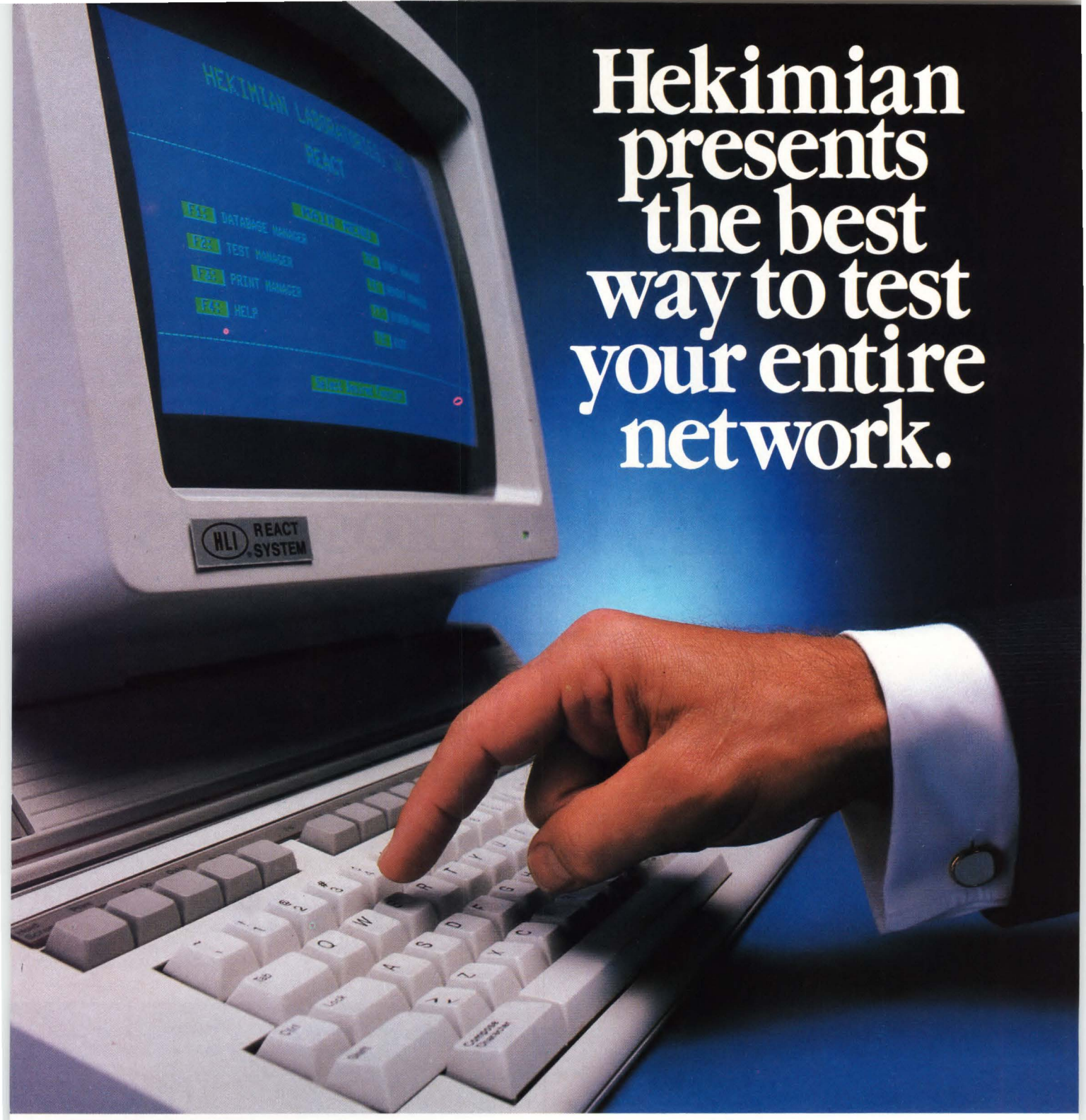
Crafting means more than just familiarizing users with computer-based text messaging. It also involves designing the system, determining the way entries are written, and building a tolerance among users for the typos and misspellings caused by executives.

Computer conferencing is extremely flexible. With care, it can be fashioned to meet the needs of any profession. CPA Associates of New York, for example, crafted a system to serve its consortium of 40 certified public-accounting firms. Already thoroughly involved with computers, the accounting profession is always seeking new uses for technology, so experimentation with computer messaging was a natural course. A 45-member task force logged hundreds of hours online checking out the technology. Its conferencing-system design was drawn up just like a real committee. "We even had rules and regulations to simulate real industry committees," says conference administrator Jack Whyte, a partner in Stavisky, Shapiro, and Whyte in Boston. "At the end of the development, we called for a vote to approve the system, and the 'ayes' had it."

Today, CPA Associates has more than 60 conferences using Version 3.3 of Participate on the communications network from ITT Dialcom Inc., Silver Spring, MD. "We are able to serve our clients better than we ever could before," says Whyte, who thoroughly enjoys using the system. Once, he claims, "In one hour and eight minutes, I read and answered 64

(Continued on page 110)

"In the wake of the Three Mile Island incident, the Nuclear Safety Analysis Center adopted computer conferencing to prevent future disasters."



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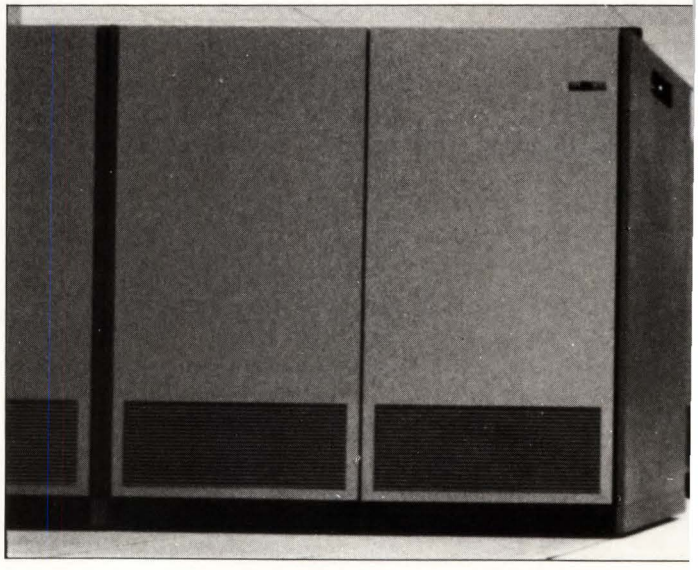

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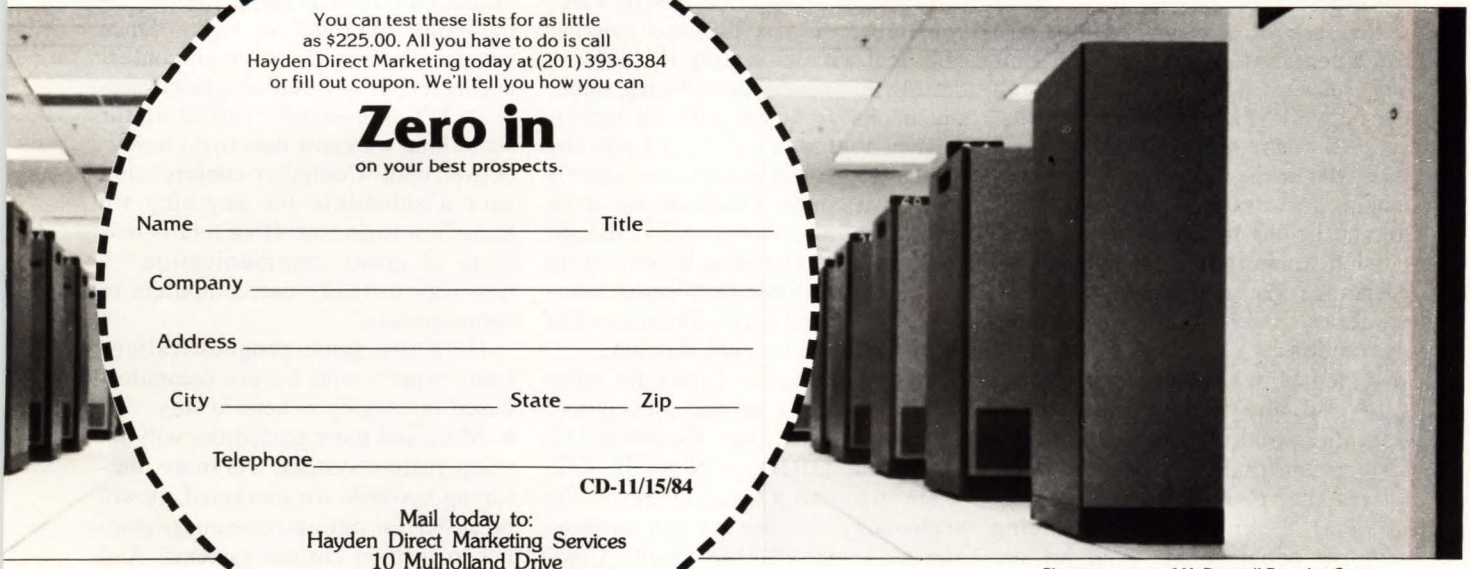

Photo courtesy of McDonnell Douglas Corp.

COMPUTER-BASED MESSAGING

(Continued from page 106)

notes. I've never been so productive in my life. I've had single phone conversations that lasted longer, and I wasn't even sure what was said at the end of them."

Stavisky, Shapiro, and Whyte's system is easy to use, according to Whyte, but it has a steep learning curve. Still, he believes the system's benefits outweigh the loss of time spent learning the system. "It takes 30 days to be fully comfortable with electronic mail, 90 days to reach the same level of comfort with computer conferencing, and 180 days to learn database-search skills," he says. "Database search may require too much training for most executives to bother with, but they are usually willing to learn electronic mail and conferencing."

Crafting is important during the early, tender days of a new system, but its usefulness continues long after the system is up and running. All sorts of subtleties are explored during the crafting stage, and for that reason, a facilitator, or moderator, is necessary. "In conferencing, there are ups and downs—during a lull in activity, it's the moderator's job to stir up usage. The facilitator also lets users know if they're typing in the wrong kind of messages."

Because messaging systems are topic-centered, it's important that only relevant notes are sent through the network. Private or personal discussions waste other users' time. "I'll meet you at the airport at 3:15, really looking forward to getting together," doesn't belong in the middle of a discussion about how the most recent corporate crisis can be solved. It's the moderator's job to weed out these distractions.

Rich Miller, designer of Notepad and now a data-communications and computer-based messaging consultant in Palo Alto, CA agrees that to be efficient and economical, "computer conferencing requires management." And, he continues, it must be by human beings—not more machines. "Such management can't be automated any more than a traditional meeting can be automated. Computer conferencing is a new medium—and it requires new skills," Miller says.

"Our computer-based text-messaging system is an internal marketplace for the exchange of ideas."

—Friedrich, DEC

According to research by both EIES and the Western Behavioral Sciences Institute, moderating computer conferences actually requires two types of skills, which may be found in a single manager, but are better handled by two individuals. These are the roles of chairperson and the tutor or coach.

The chair defines the context of the conference, summarizes and comments on its content, and points to the directions it will take. The coach encourages participation, answers questions about the system, and polices users. Both share the responsibility for continuing to define context, enrolling new members, educating users who are setting norms, and pointing out network activity.

If all this sounds like a lot of work, remember the last business meeting you held without stating its purpose, setting an agenda, and placing someone in charge. If you got a lot accomplished that way, you can forgo the moderator. But if your organization is like most, those functions are done naturally and automatically, though perhaps unconsciously. When setting up these electronic text-based meetings, you'll need to give these familiar tasks just a little more thought.

What's in the future for computer-based text messaging? International Resource Development (IRD), a Norwalk, CT, market-research firm, believes the technology "is going to boom, surpassing one-to-one electronic mail." Comparing growth of electronic mail and messaging, the report expects messaging growth to be "slower, but inherently more stable. By the end of the decade," IRD projects, "it is likely that most companies will have in-house computer-conferencing systems available for their employees for a wide variety of activities, from placing online classified ads and distributing corporate information, to extended planning, meetings, and random information searches."

Rich Miller isn't so sure. "Five years from now, computer-based message standards for electronic mail will be firmly in place. Various countries will have interconnecting systems so that entering a mailbox on one system will get you to all others. Computer conferencing requires a central computer, and that's just not the direction in which the technology is headed. Distributed conferencing is not a trivial problem, technically."

Roger Loeb of International Tele/Conferencing has different views. "Electronic mail is going the way of the Pony Express," he says. "Once people experience computer conferencing, electronic mail will just disappear. It's an expensive substitute for something we know how to do now—deliver mail. Computer conferencing isn't a substitute for anything we know how to do now. It's a totally new form of group communication—a new way to really use computers to communicate."

Here are some prognostications from experts who believe computer-based messaging is here to stay:

- More and more companies will develop custom systems. As more messaging systems are marketed, it will be easier for data-processing personnel to fashion custom systems. And

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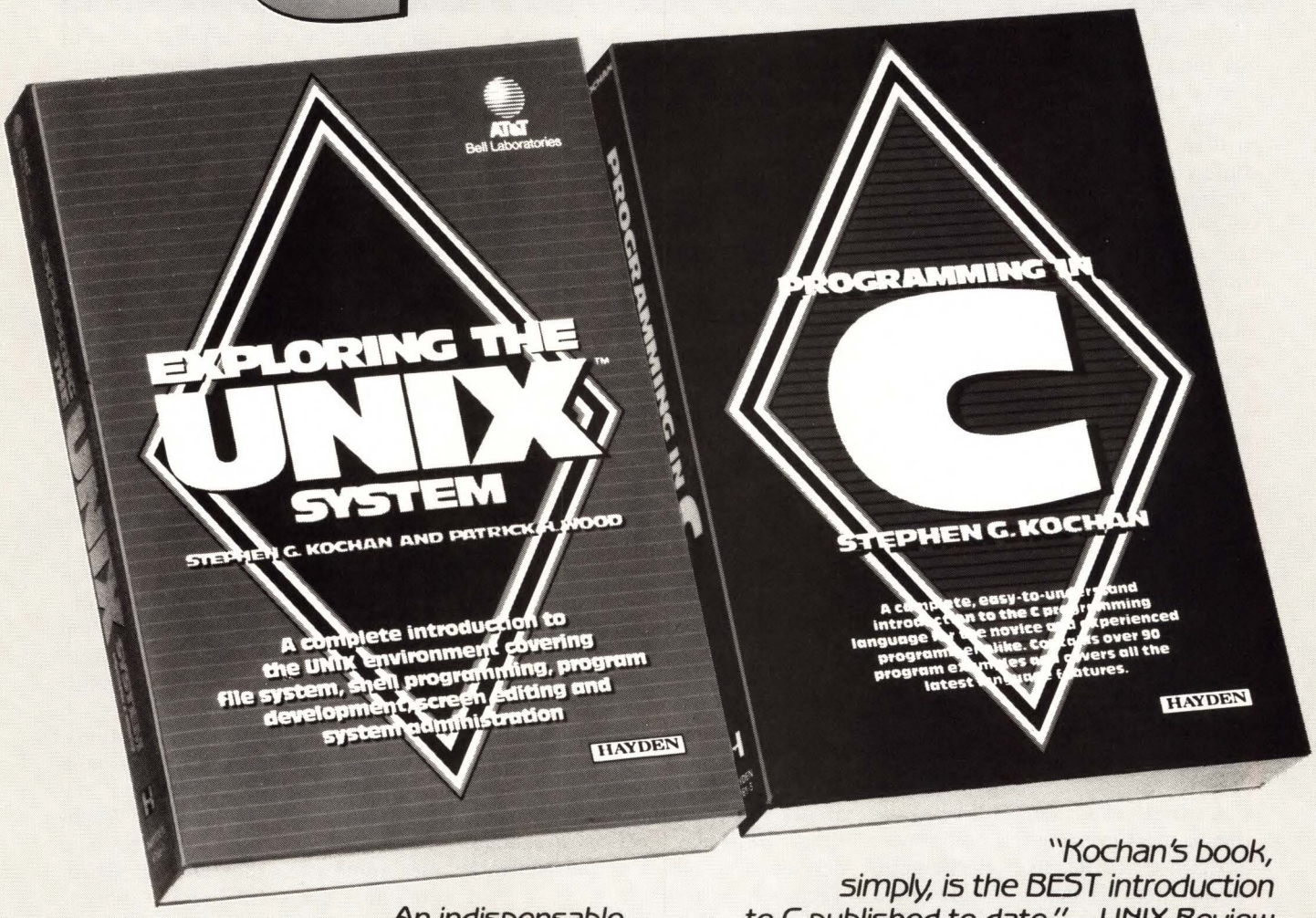

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CIRCLE 20

they'll have help. Network Technologies Inc., Ann Arbor, MI, has already offered a hand to several user organizations. According to Lawrence Brilliant, chairman: "We're creating conferencing systems for unique applications, no matter what operating system the host computer uses. We're able to wrap conferencing and other computer-based messaging systems around existing databases to provide an application that meets the customer's unique needs.

- Businesses will be able to take advantage of a buyer's market. Until very recently, if you wanted to buy messaging software, you had to choose between using an unreliable, unbusinesslike, or expensive time-sharing system and licensing code to run on limited hardware or under an esoteric operating system. The number of systems and vendors is growing—and more are waiting in the wings. Also look for added features: "We'll be offering graphics within 18 months," says Ren Breck, head of business development for Infomedia Corp.
- A variety of systems will be available to meet every user's preference. Gerhard Friedrich likes Participate, for instance, because it was designed by users, not by technical wizards. But Towers, Perrin, Forster, and Crosby, a New York-based consultancy, is pleased with Adesse's Contact system, which was designed by just such "tekkies." Contact grew up in IBM's VM/CMS operating system, unlike other systems that are being migrated from minis to mainframes.

"Computer conferencing is a new medium—and it requires new skills."
—Miller, consultant

"A successful pilot project will tap the energies of innovators—managers who like to be change agents."

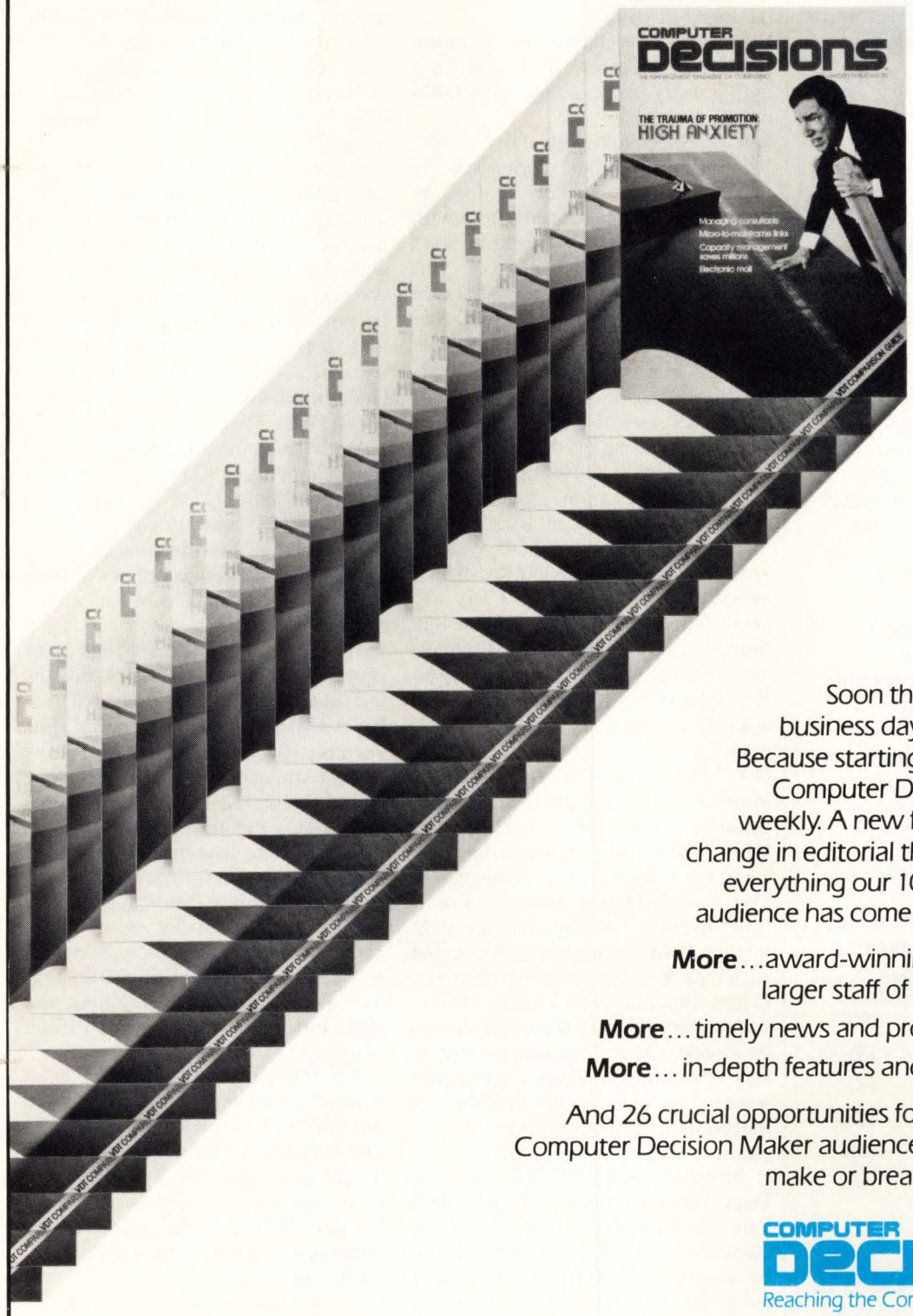
TPF&C consultants spend hours poring over indices of articles and books to solve client problems. When Contact is up and running, they'll be able to access database information online as well as confer with colleagues for the latest know-how. Contact's sophisticated key-word search capability will help.

- Watch for in-house messaging on micros. New Era Technologies, Washington, announced a system in May that lets small businesses or sections of larger organizations run text-messaging on a micro. Running on the IBM Personal Computer XT, Conexus offers sophisticated software but allows access for only one caller at a time. Multi-user versions are being developed by New Era and Network Technologies Inc.
- There will be linkups of entire fields. The newly announced National Health Information Service is a huge database/text-messaging/electronic-mail system for hospitals and physicians. Marketed by the Phoenix Companies, Philadelphia, this network can connect 7,000 hospitals and 250,000 medical offices. The project is being sponsored by Network Technologies through a joint venture with the American Hospital Association, General Electric, and the Commission on Professional and Hospital Activities. Expect similar developments in education as well.
- More value-added networks will appear in the future, each with a special job for a specific industry. One of the earliest such networks was Delta Force, a combined U.S. Army/civilian consultancy whose mission was to determine the Army's future. Its creator, Col. Frank Burns, retired last year and started a private network running on Confer II. For its select community, the Meta Network provides a unique meeting place of ideas and personalities.
- Expect major vendors like IBM to tout local-area networks (LANs) running under Bell Labs' Unix. Ken Showalter, a Washington consultant, puts it this way: "Why should anyone pay another company $20 a day to send messages to the guy in the next office?" He predicts "LANs for conferencing within the same building, and exchange mechanisms with transparent porting for long-distance communication."
- Systems will become smart. Adesse is already working on making its Contact software responsive to common user errors so it can provide helpful prompts. And the all-important mailbox will eventually arrive.
- Look for user-designed systems. Says Richard Coughenour, Citibank vice president and chairman of the Electronic Mail Association, Washington: "As all forms of electronic messaging affect more and more people's lives, users will discover applications. And the industry will follow users' leads."

This will be a great boon to business, according to Bill Paul. "Being able to stay more or less permanently linked to far-flung branches of a corporation, in spite of time and space, promotes the collaboration, teamwork, and networking that are essential in turbulent and highly competitive times." This requires a communications tool that provides convenience, speed, and selective access. Computer conferencing may be one of those tools and is, potentially, the best one. □

Susanna Opper is a New York consultant who designs, initiates, and supports corporate electronic-communications systems.

Computer Decisions Delivers 26 Issues Starting in January



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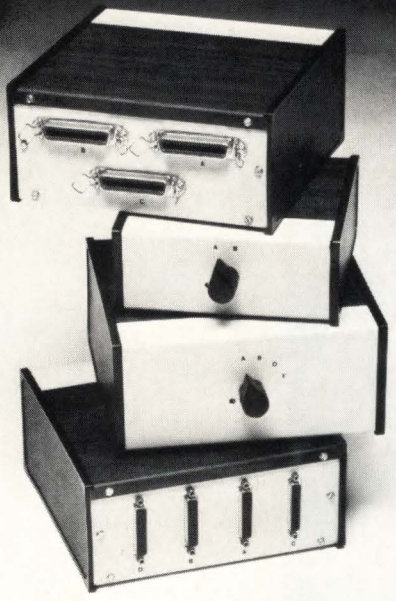

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CIRCLE 22

TERMINALS

(Continued from page 58)

storage systems. Executives estimate that a worker using this system in a high-density area can read up to 2,000 meters a day.

The speed and ease of use of portable terminals connected by radio link is likely to lead to many applications. Corporations with field technicians, for example, may find these portables valuable. But users can't be too far afield: distance from the transmitter is limited. Despite range limits, though, systems can feed data from 30 to 70 terminals to a base transmitter that then communicates with the computer. Such systems are being used to take inventory in huge warehouses that are often 500,000—and in one case, over 3 million—square feet in area.

The advantages of these systems are their speed and accuracy, which materials-handling experts say are perennial problems in warehousing. Since January 1983, AT&T Technologies' Georgia plant has been using an RF system from Maguire Data of Atlanta GA, which uses RF terminals manufactured by LXE of Norcross, GA. The handheld and forklift-mounted RF terminals feed data through a base station and into two DEC PDP-11/73 minicomputers. Before implementing the system, Shirk says, the plant used a standard real-time inventory system that fed data into an IBM mainframe. "We ended with high data-transmission costs and mountains of tabulated paper. Our results were anywhere from two days to two weeks out of date, and we had no way of finding out what transactions were taking place," says Bill Shirk, a materials-handling engineer at the plant.

Although each LXE 2020 Portable Data Terminal costs around $3,000, and the Computer Interface Unit costs around $7,000, the payback can be considerable. Shirk estimates that using RF terminals for warehousing has saved millions of dollars since the system was put into operation. The savings, he says, include $500,000 in real-time transmission costs and software rentals, and $1.2 million due to an inventory reduction. "We don't have to store safety stock anymore," he says.

Radio has the advantage of bypassing expensive phone and electronic network time, an expense that many users of portable terminals contend with. It also eliminates excess lines. As yet, however, the cost-effective transmission of complex data over long distances has not been achieved by radio—although LXE's Bob Goodman believes this breakthrough is just one or two years away.

With developments in portable terminals moving in so many directions, managers looking for the right terminal at the right price are faced with often bewildering choices. Users and dealers suggest a number of considerations to keep in mind, the major one being function.

If the intended user is a field sales representative who just wants to collect messages, all that's needed is a keyboardless receiving terminal. For example, Bo Rothchild of ADP Collision Estimating Services, gives adjusters Quint KSR 745 or Receive Only (RO) 745 terminals.

If a remote user needs to send a large volume of information into central processing, a fast machine that uses up a minimum of expensive telephone and cpu time is recommended. If a user composes a lot of written text or makes numerous corrections, the ideal terminal would permit offline editing.

The final important factor to keep in mind is that portable terminals are intended to be an economical way to provide the exact amount of computer horsepower necessary. This was aptly summed up by Telxon's Randy Veatch: "The average portable terminal is not an executive workstation, it's a tool." □

Miriam Lacob is a New York-based free-lance writer.

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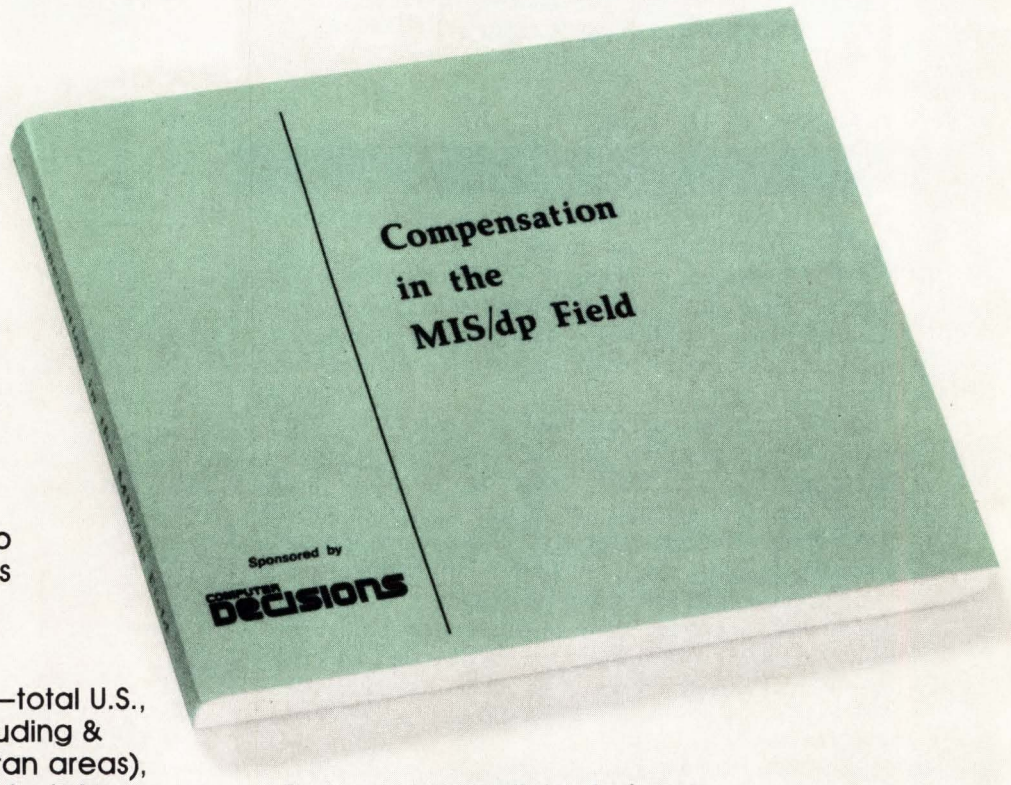

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MAKING MICRO MESSAGES FLY

by Robert A. Moskowitz

Most companies want a computer-communications system that is easy to use and fast," says Darryl Henderson, president of SOS Computers, a Los Angeles-based consultancy. "The ultimate system would let a user strike a single key—or even voice a command—and move the desired information from one computer to another lickety-split."

So far, most personal computers remain considerably less accommodating than that. They require a good deal of button-pushing, particularly when you first establish the link between your machine and another. You then have to push even more buttons to specify the data you want to send or receive. In many cases, raw files of information from a spreadsheet or database program cannot be transmitted safely until you process them—again under manual control—to remove any hidden computer codes that can interfere with the transfer process. As a result, exchanging data electronically can be a lot more difficult than with conventional methods.

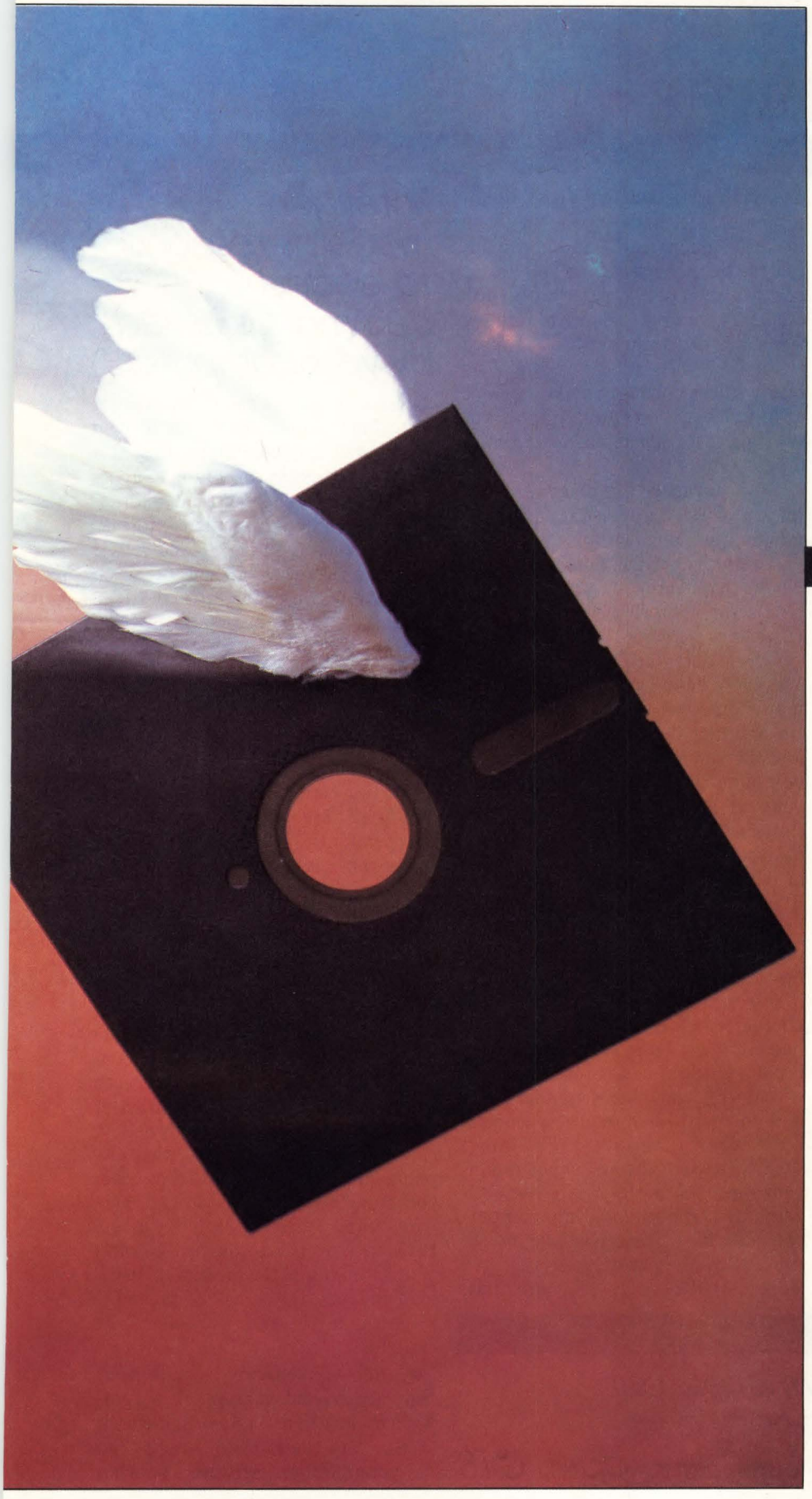
Until these problems are eliminated, many potential users will remain wary of the benefits of computer communications, suggests Henderson. "Most business people are unhappy with systems that are complicated or tedious to use. They really need something approaching the one-key concept before they can enjoy and appreciate electronic communications," he says.

Corporations may have to wait for instant-communications capabilities, but data transfer has been streamlined significantly, thanks to increasingly intelligent modems. For example, one auto-parts supplier in the Pacific Northwest has programmed three new super-intelligent modems with phone numbers of other auto-parts suppliers. When a request arrives for a part not in stock, the employee in charge punches the part number into the computer, which then programs the modems to automatically contact the computers of all the other suppliers to see which do have it.

In Los Angeles, automatic modems poll the readings of computerized air-pollution stations. Each station has measuring devices that feed the data into a tiny computer's memory. The modems connect with those computers regularly, and extract the latest air-quality readings, which are then compiled and analyzed at the central office.

Modems are also being used to replace expensive, single-purpose Telex terminals with flexible desk-top computers. And they are key to establishing electronic-mail networks that transfer messages and information over telephone lines, even when the recipients are away from the office.

Photo by Bill Oliwa



Faster, more intelligent modems function while your computer's down or you're away from the office.

The modem is the crucial element in any communications system. This piece of electronic hardware transfers a sending computer's digital (on/off) signals to analog (continuous and variable) signals the telephone lines can carry, and does the reverse at the receiving computer. Modems come in two designs: the internal type, which plugs into a specific micro's expansion slots, and the external type, which uses a fairly standard cable and connector to plug into the serial communications port of a wide variety of computers. Desk-top computers usually have such a port or can be fitted with an adapter card to provide one.

Many portable computers come with a built-in modem. However, if a portable has the necessary connector, an RS-232C, it can use any modem that will work with a desk-top computer.

Because the modem is so essential, the ease and speed with which a personal or portable computer can communicate depends largely on the capabilities and design of its modem. Different parts of the telephone network have different signal strengths, and very often a connection will have loud static or echoes—you've probably heard such noise on your telephone. It doesn't take very much noise, or signal weakness, to interfere with the subtle tones modems use to

exchange information. When that happens, errors and slower transmission speeds result. Occasionally the modems may be unable to connect with each other at all or may suddenly disconnect in the middle of a transmission.

"We're finding that users *like* modems with bells and whistles, but *demand* reliability, speed, and accurate communications," says Mike Kapel, marketing communications manager for CTS Corp. "The automatic features are conveniences, but most users would give them up in a flash if the modem had a hard time latching onto the signal of another computer and getting the data across without a lot of repeated efforts."

All modems perform the same fundamental job: contact another computer to transfer information. But there are significant differences in the electronics, capabilities, command structures, and performances of different models. These differences come into play in four critical aspects: intelligence, ease of use, speed, and price.

A modem's intelligence is a shorthand description of the sophistication of its electronics. Dumb modems, like the Teledata P.C. Modem from Stewart Instruments, simply provide the basic digital-to-analog conversion. It's up to you to dial the number you want and switch on the modem at the appropriate moment.

Intelligent modems respond to coded commands issued from your computer. The command structure first popularized by Hayes Microcomputer Products has become something of a *minimum standard* for intelligent modems. These devices not only convert the signals from digital to analog and back again, they also make telephone calls, and can monitor the telephone line and "tell" your computer's software about such events as when the phone is ringing, when another computer has answered a call, and when it has hung up. As a result, these modems make possible automatic dialing, telephone answering, and other sophisticated communications.

More advanced intelligent modems let you switch between data and voice communications without having to dial a number twice. Some also sense what's happening on the telephone line and signal your computer ("phone ringing," "line busy," "carrier detected," and so forth). Voice and data switching are convenient if you want to send a colleague a file and then discuss what it contains, and the new sensing features let your computer monitor the progress of your call and display descriptive messages right on your screen. Previously, you had to monitor the status of the phone line yourself by listening to the modem's speaker or picking up an extension telephone, which can be difficult and annoying in a crowded, busy office.

Super-intelligent modems provide all the basic features of the others, but also have built-in programmable memory. Some of these modems simply store telephone numbers and dial them without requiring control from your computer. The most sophisticated of the new super-intelligent modems, however, are like self-contained communicating computers, and have their own clocks for time-delayed operations. They can store a whole series of commands,

"Intelligent modems respond to coded commands issued by your computer."

codes, and files in their own memories. They can monitor their own clocks and start communicating at a pre-set time, day or night. Super-intelligent modems get their instructions from and deliver their information to your computer, but you can be asleep or busy with other work—even have your computer turned off—while they carry out those instructions.

This means a super-intelligent modem can dial another computer, make contact with it, ask it for the files you told the modem you wanted, receive and store those files, send material you have stored in the modem, and finally break the connection—all independently, without active help from your computer.

"You can use these modems with the smallest personal computers, and still have a very powerful communications system," says Brad McMillan, president of Visionary Electronics, a manufacturer of super-intelligent modems. "If you're using a portable computer that has an RS-232C connection, you have the best of both worlds: You can take your computer traveling with you, while your modem stays in the office to answer the telephone and take messages from other communicating computers or electronic-mail systems. When you get back to the office, you just connect your computer to the modem to download any messages it has stored and to program it to send new ones," he explains.

"Users like bells and whistles, but demand reliability, speed, and accuracy." —Kapel, CTS

Such sophisticated capabilities are wasted, however, if a communications system is difficult to use. And the modem—more than the computer or software—is what

makes a system friendly or surly. For example, a super-intelligent modem with built-in dialing memory can place a call, even if your software can't. On the other hand, no amount of computer sophistication or software features can provide automatic dialing or time-delayed operations if your modem lacks the electronics to perform these functions.

For example, auto-dialing is a useful feature that lets the computer make a telephone call under software control. Without auto-dialing, you would have to look up or remember all the numbers you need and punch them into your telephone to dial another computer. When it answers, you have to give a command or throw a switch on the modem to establish contact between the two computers. With auto-dialing modems, however, you can give a single command to have your computer dial a number and establish computer-to-computer contact.

Similarly, modems with the auto-answer feature allow an unattended computer to answer telephone calls. When your phone rings, your modem answers and alerts your computer, which then sends or receives information under control of the calling computer. Without an intelligent modem, however, this isn't possible.

Another feature that makes communications easier is "auto-log-on." The super-intelligent modems offer it independently, but intelligent modems can do it with the appropriate software. Normally, accessing a dial-up computer system involves answering a series of questions with the proper names, passwords, identification codes, and command sequences. The entire exchange is identical every time you contact the database, but there's no way to bypass it. However, you can automate the log-on process and let your computer handle it by itself. With auto-log-on, the computer takes care of responding to the host computer's inquiries for user names, passwords, billing codes, and other repetitive details.

The third important factor in communications convenience is speed, which depends almost entirely on the electronics and features of the modem. Until about two years ago, most modems for desk-top and portable computers could run only at a baud rate of 300. "According to a survey of users," says Henderson of SOS, "before 1983 approximately 75 percent of desk-top and portable-computer communications took place at 300 baud. But in the past two years, users wanting faster transfers have forced the development of a wide selection of modems that operate at both 300 and 1,200 baud. And some 2,400-baud modems are now beginning to appear."

The faster the baud rate, the more information you can communicate in a given period of time. At 300-baud rate, which is roughly equivalent to 30 characters per second (cps), a double-spaced typewritten page takes about one minute; with 1,200 baud (about 120 cps), the same page takes about 15 seconds.

Yet, most professionals agree that even 1,200 baud is too slow to handle the massive chunks of data that travel between computers. "We're now at

the limit of 1,200-baud technology," says Rick Tjader, a financial systems analyst with Security Pacific National Bank, Los Angeles. "Modem manufacturers are going to have to find some way to move the data faster. Even 1,200 baud can be a handicap in terms of downloading large chunks of a mainframe database."

Although faster speeds are in demand, standard telephone lines are poorly suited for high-speed data links. According to Brad McMillan, "European manufacturers have already developed a way to send information reliably at 2,400 baud; it will take us another year or two to do the same."

According to Neil Quatman, director of administration for International Management Communications, a London-based database and communications service, "Since most computerized data transfers involve long-distance telephone charges, and most dial-up databases charge for every minute of use, the faster you can send and receive data between computers, the less you have to pay. That's why faster modems are much cheaper and more convenient to operate, even though, initially, they may be more expensive."

This is true even though most networks and database services charge more per minute for the faster service. But few users seem to object. If you are online, communicating with another computer for more than a dozen hours a year, your savings more than offset any extra charges.

"The 1,200-baud setting is very important when you are dealing with vast quantities of information," says Dr. Ho Van Cae, an economist with the Bank of America, in San Francisco. Dr. Cao regularly downloads economic statistics from Data Resources, Chase Econometrics, and Bank of America's own mainframe onto his IBM Personal Computer equipped with a Hayes Smartmodem.

He uses such data as employment statistics, state and national gross national product, per capita income, and new housing starts for trend analysis and economic forecasting. He also retrieves weekly economic news and statistical analyses, and makes use of analytical software on the bank's mainframes.

"Downloading so much data would take too long at 300 baud," he reports. "I can use 300 baud only for moving small files between the bank's internal computers and my micro."

Like every other item of hardware, as modern technology grows increasingly sophisticated, prices drop. But unlike other computer peripherals, modems have not dropped in price as drastically as one would expect. Prices are certainly subject to competition," says Bob Miller, vice president of sales and marketing for part of Cermetek's product line. "But there hasn't been a dramatic drop in the prices of 1,200-baud modems. You might see some further erosion, but you won't see prices fall through the floor. Instead, increased speed and more features are being added very fast and the prices will be staying up because of the new features."

Although prices will fall only slightly, manufacturing breakthroughs will noticeably improve the price/performance ratio of popular modems. Texas Instruments (Dallas) has developed a 300-baud modem on a single chip, for example, and is coming out with a 1,200-baud version. Meanwhile, Intel (Santa Clara, CA), the computer-chip manufacturer, is reportedly close to putting an advanced, full-featured modem on a chip. History shows that advances in computer-chip technology are quickly reflected in lower prices at sales counters. As modems get smaller and cheaper to make, manufacturers will compete more and more heavily on price.

Right now, a 1,200-baud modem with advanced features costs about $500, and the simplest ones can be purchased for under $300. Newer 300-baud modems are now available for under $100. Although the lower-cost units lack the intelligence and super-intelligence of other modems, they still perform the basic function of transmitting computer data over a telephone line.

One of the key features that make portable computers so attractive is their ability to exchange information with computers back at the office. This allows managers on the road to analyze data, send and receive information, and keep in touch with events and changing situations at the office from virtually any phone. But it takes a lightweight, reliable modem to make this possible.

Portable computers are preferred for their light, compact designs. Some weigh only three pounds yet provide substantial computing power and built-in 300-baud modems. The drawback to these portables with built-in communications is that 300 baud may not be fast enough, while a 1,200-baud modem takes more room, draws more power, and may make the case too bulky. What's more, if you travel far enough, you're bound to reach territory where the Bell System standards do not apply and your built-in modem is useless.

The solution is to find a portable computer with an extra RS-232C connector. With this installed, you can plug in and use virtually any external modem instead of the built-in one. But some of the lightest machines are self-contained, without the necessary connector for an external modem. One portable that has the connector is the Epson HX-20, which tips the scales at just over four pounds. Another is the Gavilan SC, which weighs just nine pounds. Others are adding the connectors on their newer models. (For a detailed report on portables, see the November issue.) As you move up to the heavier portables, the connector for an external modem becomes more commonplace.

"Although faster speeds are in demand, standard telephone lines are poorly suited for high-speed links."

Nearly everyone in electronic communications agrees that the demand for modems will continue to increase. Computer users that start with self-contained software and information eventually want to use files from other programs. And not too long after that they want to exchange large volumes of data with computerized databases and other users far away. The more users know about computers, the more important it becomes for them to communicate.

Microcomputers are rapidly being redesignated as "workstations." The new name implies an ability to exchange information electronically, including electronic mail and links between the micro and the organization's mainframe computer. All this requires a fast, intelligent modem.

"There is already a lot of competition in modems," says SOS' Henderson. "As a result, in the next two years, dozens of manufacturers will try to outperform each other by providing more functions at lower prices. There will be a continuing trend toward more features, higher baud rates, and more intelligence. As modems get smarter, they'll learn how to match each other's protocols without guidance from the user. Eventually, you'll be able to connect any computer to any other computer on the first try, something not always possible today."

One of the last remaining stumbling blocks to modem usage is that they will not operate internationally. According to IMC's Quatman, "The telephone systems are electronically incompatible, and international travelers often have to carry two modems with them: one for telephone systems that observe the Bell System standards, and another for systems that use the CCITT standards in Europe and the Middle East."

Portable computers with built-in modems are at a particular disadvantage for overseas travel because their modems are usually set up for the telephone system in the country of purchase. If the computer does not provide an external RS-232C port where you can connect a foreign modem, you'll be unable to communicate with your home base from other parts of the world.

"There's a definite need for a modem that meets both Bell and CCITT standards," Miller suggests. Although American telephone systems are the best in the world for voice communications, the CCITT standard allows for faster baud rates on low-quality lines. So there will continue to be at least two standards and specific advantages to each of them. □

Robert A. Moskowitz is a free-lance writer from Woodland Hills, CA.

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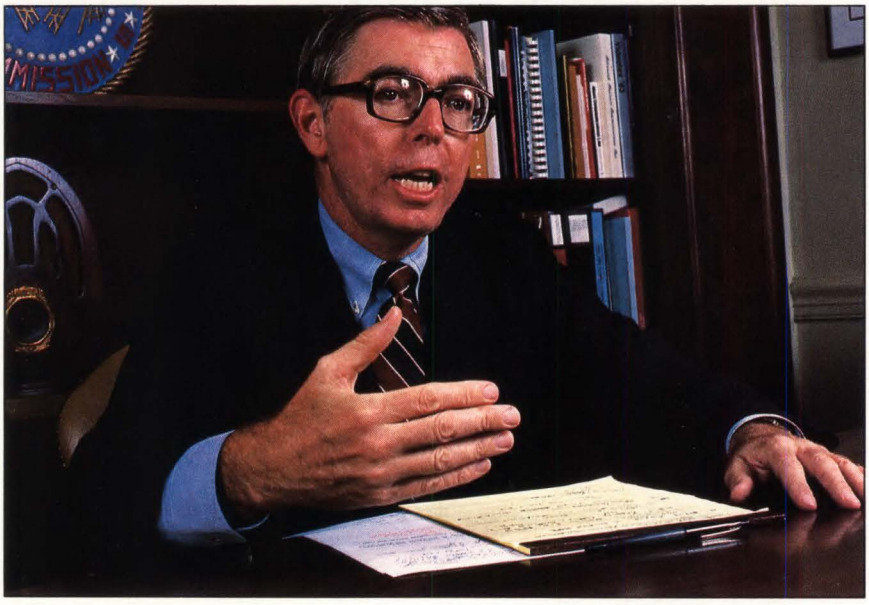
WILEY ON TELECOMMUNICATIONS



Former Federal Communications Commission chairman Richard Wiley calls himself a long-time "apostle" of competition in telecommunications. During his tenure at the helm of the FCC (1974 to 1977), the commission began hearings on the Second Computer Inquiry, which produced a decision known as Computer II in 1980. Wiley had departed for a private law practice by then, but the decision was a landmark in the elimination of AT&T's monopoly on phones and switching equipment. In a recent interview with Computer Decisions *Editor Mel Mandell, Wiley expressed some doubts about the direction of events more recently—particularly the breakup of Ma Bell.*

Question: Americans once spoke of their phone system as being the best in the world. Do you still believe this is true?

Answer: Yes! We've got the marvel of the world, and I don't think that has fundamentally changed. This is not to say that we haven't seen some problems occur that would not have arisen under the monopoly situation. But I still think Americans are receiving the best telephone service attainable.

Question: In view of some of the turmoil and problems you referred to in common-carrier communications, do you question the decision that split up AT&T?

Answer: It wasn't one that many people, from a policy standpoint, were permitted to question. Keep in mind that this was the result of two litigants coming before a judge and making an agreement. That's not the best way to make public policy.

Question: In effect, you're suggesting that it might have been handled better or differently or slower.

Answer: Well, if it had been handled through a process of legislation or through the FCC, a lot of these other subsidiary issues that are also very important would have been thought through. Now this isn't a criticism of Judge Greene. Given the case that was put before him, he probably handled it as well as he could have.

For 10 or 15 years, I've been an apostle of more competition among common-carriers. I was not necessarily a proponent of breaking up AT&T, however.

Question: Right now businesses are experiencing tremendous turmoil in communications via the switched network. When, if ever, is this situation likely to become easier for businesses?

Answer: I don't think it ever will. Those days are probably gone in which you had a monopoly that could make all the decisions. Now you've got to think. You've got to know your service offerings and your vendors.

You've also got to have some professional within your company who can advise top management on what the best array of services and equipment may be. One problem that may ease a bit is the private line backup that we suffer. Eventually, when AT&T gets over the hump, so to speak, some of this problem will be worked out. But it also may be, frankly, the result of too much demand.

Question: Where are these corporations—of which my readers are a part—going to find the talent to handle this big need?

"I sympathize most of all with businesses, because it's a whole new world out there."

Answer: Well, it's going to be difficult. It puts more and more demand now on the communications managers of corporations. The data processors had to do it; they had to train expert people within their organizations. And now communications carriers are going to have to do that same thing in the future. Communications managers' jobs are going to be much more important because, with the wide range of options and alternatives available today, somebody has to give top management advice.

Question: As a result of the breakup, AT&T seems to be floundering in some respects. How long do you think it will take for AT&T to get its act together?

Answer: Well, I'm not sure that they are floundering quite so much. I have great respect for their abilities. They are going through a difficult period in which they've had to completely restructure all their business relationships and their internal business structure, and that's going to take time.

Question: Of course, there are some other big competitors. IBM has just acquired a larger stake in Satellite Business Systems from Comsat. Do you expect more aggressive moves now by SBS into voice and data services?

Answer: Well, that had to happen whether or not IBM bought out Comsat. I'm not sure the timing necessarily suggests that now IBM is going to be aggressive and that it wouldn't have been before. It's absolutely essential for SBS, if it is going to be in this market, to make the necessary investments to do it. And one of the markets in which it is likely to become a real competitor is interexchange voice telecommunications. In other words, I expect SBS to compete strongly with MCI and with Sprint.

Question: In spite of Judge Greene's recent ruling prohibiting the Bell operating companies from offering long-distance services, do you expect them to become more formidable competitors to AT&T in the future?

Answer: Judge Greene's decision has sharply limited their range of activities. Maybe that will change someday, but right now the Judge is saying to them, that they've got to focus on the local market. Inside that local market, they will be the dominant carrier, and they'll be very formidable in equipment and other offerings. But in transmission services, we're going to have that fine line drawn between interexchange and local exchange for the time being.

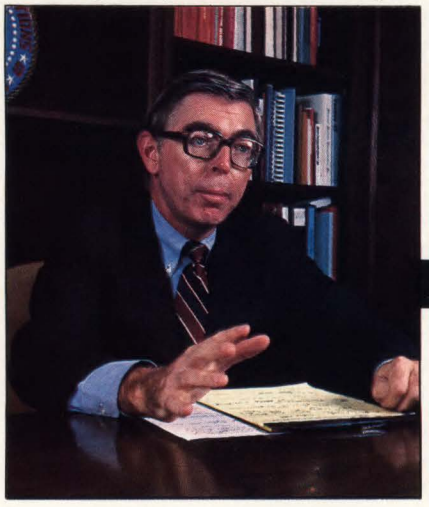
Question: Will Judge Greene always be there to make these decisions?

Answer: Well, who knows about that? The court certainly will be eternal and someone will be making those decisions. The Judge, appropriately so, will be looking at the FCC to play its fundamental regulatory role.

We should get away from court-driven telecommunications policy as quickly as we can get it back to the FCC, overseen by Congress. That's where telecommunications policy really ought to be made.

Question: Any last words of wisdom for corporate executives in the Fortune 1,000?

Answer: Well, one of the concerns I have is that we don't fall into a policy paralysis. For example, on access charges, the FCC is frustrated in its inability to effect a result. Congress is unable to pass legislation for one reason or another in this complex field and, therefore, no decisions are made in situations in which businesspeople have to know the rules of the road. I sympathize most of all with businesses, which have to use telecommunications services, because it is a whole new world out there for them. And they are never again going to have a situation as simple as it was in the past. However, the hope is that we will have a more efficient system, a more innovative system, and, someday perhaps, a more cost-effective system in telecommunications. That's the long-term objective of competition, and I think we'll get there someday. □



"I've been an apostle of competition for 10 or 15 years. I was not necessarily a proponent of breaking up AT&T, however."

DON'T GET TRAPPED IN YOUR WEB

This article by Heidi A. Waldrop appeared in its entirety in the August issue of Computer Decisions.

Composite from photos by Larry West and Rick Barrick

You're not alone if you've been getting snarled in your communications network since AT&T broke up. Horror stories abound. Coping with a bewildering array of product, functions, and services is a reality that has been forced on many corporations that formerly handled problems with a single call to their AT&T national-accounts manager.

Visa USA Inc., the big credit-card operation based in San Francisco, installed its own network-control systems as a defensive measure. "The pressure is on us to identify network problems and know which vendors to contact to fix them," says Ron Davis, senior analyst of Visa's telecommunications network. Visa joined with Atlantic Research Inc. to develop a network-management system for its two data centers housing five IBM 3083 mainframes serving 15,000 member banks. Visa needed a performance analyzer that could diagnose troubles at the member banks. Visa installed Atlantic Research's RCS 100 remote switches and Network Test and Management System at a cost of about $100 per member bank. Davis believes the cost is more than justified by the network security the system provides.

When a communications problem arises, you may find yourself able to do little else but round up the usual suspects and reach no conclusions.

For some corporations, such as McDonnell Douglas Automation Co., the problem has become critical. "The vendors involved sometimes blame one another," says James Anderson. When the Bell system splintered, McAuto decided to seize the initiative and assert control over its own network. McAuto is installing its own high-speed digital links to bypass the common carriers. "We can reduce the number of carriers involved from three or four to one," Anderson says.

A significant portion of McAuto's network-control budget is dedicated to training. Signing up a strong team is vital but having the right tools to manage your organization's network is also an essential issue. Dixon Doll of the Ann Arbor, MI-based DMW Group believes that the tools corporations need just haven't been invented yet. "There's a horrible lack of testing and diagnostic equipment."

But despite his dissatisfaction over the limitations of existing network control tools, Doll doesn't advise corporations to wait on installing a network.

For many corporations, remote control is the biggest cost-management issue of the post-divestiture era. New York-based retailer J.C. Penney has cut technical staffing costs and hastened the installation of 700 new lines since it installed Paradyne's 5530 network-analysis system in February. "The system allows us to centrally maintain modems without having highly qualified technicians out there doing the work," says Roger Williamson, network manager. "What used to take 45 minutes now takes two."

As networks become more complex, the emphasis is shifting toward software that can spot dangerous trends and potential trouble spots. Corporations moving to take advantage of new software tools are setting up databases of network-performance information. With no additional hardware, a manager can use software to probe performance data for signs of impending problems.

Network-performance reports also help to improve service to users. Reports help to eliminate complaining and bickering about service levels by laying the problems out for all to see.

As corporations gain more experience with their new network management responsibilities, the definition of network control has begun to expand. Some, for example, are integrating network-planning software into their network-control systems.

Security is the other new component in network control. Net/Guard, a new product from Avant Garde Computing, designed to secure dialup lines, is being put to the test on Shearson/American Express' network of 11,000 terminals world-wide.

Net/guard employs a database that stores information on users and usage. The system keeps track of who logs onto each terminal, how long they work, and so on. The system also acts as a protective shell around Shearson/American Express' files and systems. If someone tries to crack the system they're actually trying to crack Net/Guard, not the production systems, but they get bounced before they can get to the host computer.

Your corporation's network is your responsibility. You'll avoid snarls by assembling the right tools and using them to keep the organization and network in tune. □

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CIRCLE 25

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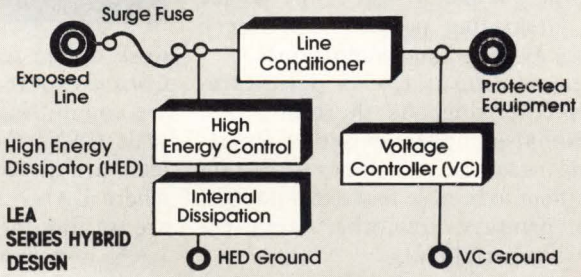

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CIRCLE 26

LANS: THE PROMISE AND THE PAYOFF

This article by Software Editor David Kull appeared in its entirety in the April issue of Computer Decisions.

Computer Decisions recently invited a group of experts in connecting electronic devices to discuss how organizations can best take advantage of the opportunities presented by electronic information exchange. The experts pointed out potential gains from local-area networks (LANs), which link information devices within office building, factories, or complexes. And they explored the difficulties of setting up such a network.

Question: Why are local-area networks important?

Ted Pearlman: The LAN will tie together information technologies such as data-processing system, information centers, and electronic mail.

George Bazinet: It will be the vehicle for integrating personal computers, office systems, and mainframes.

Henwell Chou: LANs permit resource sharing. As the number of personal-computer-based workstations increases, it becomes important for them to be able to share data storage, printers, and other fairly expensive peripherals.

Pearlman: What do those personal computer networks cost?

Chou: About $20,000.

Pearlman: And they serve only a small segment of your business—six to 10 users. That's a big price to pay.

Chou: Our users have to do a lot of analyses on a lot of shared data, so we feel the cost of the LANs is justified.

McGrath: We installed Ethernet as a pilot project in my department, and we found that we were getting the work out faster and better.

Cotton: Not very many organizations are committing themselves to large-scale LANs now. A lot of pilot projects are aimed at figuring out just where LANs fit in. Many observers are waiting for IBM to introduce its LAN and expecting a shakeout of vendors after that. No one wants to be tied to a vendor that gets shaken out, so there's some value in procrastination.

Q: What kinds of problems can an organization solve with an LAN?

Bazinet: We're already seeing problems with personal computers attached to IBM 3274 cluster controllers. With their downloading and uploading of files and the sheer volume of information, they're knocking other 3270 users out of the control unit.

Pearlman: There's also the problem of moving terminals. If you must hire an electrician to run a cable, you'll wait at least a month and pay exorbitant rates.

Baron: It costs about five or six times as much to add wiring after the floors, walls, and carpeting are installed.

Cotton: We advise clients designing new facilities to provide cable access to every area. But there are several other wiring issues to consider. I've seen companies pull PVC (polyvinyl-chloride) cable through false ceilings—a violation of fire codes in some circumstances.

Baron: The alternative, teflon-

"A lot of pilot projects are aimed at figuring out where LANs fit in."
—Cotton, Booz, Allen

jacketed cable, costs about three times as much as the PVC. And electricians don't like it because it doesn't bend easily.

Q: Given the wiring, how easy is it to hook up machines that can talk with each other?

Bazinet: You can make almost any machine talk with any other. The question is: How long does it take to make them compatible?

McGrath: There are commercially available translators or protocol converters that can provide a degree of compatibility between devices—but you can't move functionality from one machine to another, and that's one of the real problems.

Bazinet: Some vendors say they'll support IBM's document-content and -interchange architectures. That will be a de facto standard.

McGrath: But these architectures are written for the least functional devices. We lose the capabilities of the higher-level machines.

Q: Are there worthwhile alternatives to LANs?

McGrath: We're looking at three alternatives: LANs, PABX's, and the information center providing services from a central host computer via a star network. We don't think any one approach will provide the solution.

Cotton: One other alternative to LANs that's feasible in some situations is piggybacking a data network on a cable-TV system.

Q: What issues should network designers consider in deciding between a broadband and baseband approach?

Passas: That decision depends on how large the network is. If you're going to have very high volume, you'll probably want broadband.

Bazinet: But if you do go broadband, you'd better be sure where you're going to put your taps. It takes a considerable engineering effort to add them, much more than with baseband.

Another primary difference between the two technologies is that broadband is very mature, while baseband has a lot of growing to do.

Chou: You may have to allow both network types to coexist in your company. One department's needs may dictate baseband; another's might call for broadband. How do you link the two networks to make them look like one? The technology for that will come.

Q: There are many issues to consider in analyzing and managing LANs. How should a company organize its effort?

Cotton: I favor setting up information-resources management to bring all the information technologies under one roof. They need to be managed as an integrated whole to take advantage of the synergies.

Passas: At FAIA, we place responsibility for design and development of communications within information services. The facility's operation is a user function, delegated to office services. But the selection of methods, hardware, and software is an engineering task, similar to information-systems design.

Q: What LAN advancements would be helpful, and which do you expect to see developed soon?

Cotton: Within the next few years, we'll see the interfaces for popular networks available on $20 silicon chips that manufacturers can build into their personal computers. This will drop connection costs by one or two orders of magnitude. Another development will be in the functionality of the PABX.

McGrath: The direction IBM takes with its LAN will probably have a great impact on our company's plans than any other development. □

Roundtable participants included Mark Baron, manager of technical planning at Witco Chemical Corp., Woodcliff Lake, NJ; George Bazinet, manager of office systems at American Can Co., Greenwich, CT; Henwell Chou, director of data processing at Travelers Insurance Co., Hartford, CT; Ira Cotton, consultant at Booz, Allen & Hamilton, Bethesda, MD; Joseph McGrath, manager of office systems and services at Warner-Lambert Co., Morris Plains, NJ; William Passas, vice president of MIS, AFIA Worldwide Insurance, Wayne, NJ; and Ted Pearlman, director of MIS, CBS Toy Division, Secaucus, NJ.

"The LAN will be the vehicle for integrating micros, office systems, and mainframes."
—Bazinet, AFIA

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Novation (818) 996-5060	Infone 2 lbs. 8 oz.	$1,145	569
	Infone 40 2 lbs. 8 oz.	$500 to $1,000	

SAMPLING OF PORTABLE TERMINALS

Portable communications terminals

Vendor	Product	Price	Circle
TEC (602) 792-2230	Data-pad 3 lbs. 4 oz.	$995	570
Teleran Communications (914) 694-9270	Portabubble/81 15 lbs.	$2,995 to $3,695	565
3M (612) 733-9000	Whisper Reader 2 lbs.	$499	567

Handheld and vehicle-mounted terminals

Vendor	Product	Price	Circle
Azurdata (206) 881-5100	Scorepak IV 4 lbs.	$500 to $4,975	571
Intermec (206) 743-7046	Models 9400B and 9410B 3 lbs. Model 9420 3 lbs. Model 9161A 3 lbs.	$1,356 to $1,750 $1,995 to $3,445 $3,495	572
LXE (404) 448-5770	Model 1020 15 lbs. Model 2020 1 lb. 4 oz. Model 120 29 lbs.	$5,000 $2,700 $7,000	573
MSI (714) 549-6000	Datawand 1 lb. 8 oz. MSI/66 1 lb. 6 oz. MSI/85 1 lb. MSI/88S 1 lb. 6 oz. VM-500, -510; BC-500, -520 13 lbs.	$265 to $415 $310 to $560 $800 to $1,300 $1,200 to $2,450 $1,000	574
Telxon (216) 867-3700	PTC 2 lbs. RFX 10 2 lbs.	$300 to $2,500 $500 to $2,500	575

FACSIMILE EQUIPMENT

Vendor	Product	Compatibility	Price	Circle
Alden Electronics (617) 366-8851	Signa Fax 400 18 x 22 Syst.	Group 3 Group 3	$8,100 $11,750	544
Burroughs (203) 796-5400	Dex 3200 Dex 3600 Dex 3700	Groups 1, 2, 3 Group 3 Groups 1, 2, 3	$3,995 $5,495 $4,395	545
Canon U.S.A. (516) 488-6700	Fax-31 Fax-510 Fax-330 Fax-320E	Groups 1, 2, 3 Group 3 Groups 2, 3 Groups 2, 3	$1,995 $3,495 $4,495 $5,995	546
Exxon (203) 329-5000	Qwip 2210 Qwip 2310	Groups 2, 3 Groups 2, 3	$2,995 $5,845	547
IBM (914) 934-4825	Scanmaster I	Group 2	$11,880 to $14,880	548
Panafax (516) 364-1400	MV-1200 MV-3000 PX-100 PX-200	Groups 1, 2 Group 3 Group 3 Groups 2, 3	$1,975 $4,495 $3,995 $6,000	549
Pitney Bowes (203) 356-7178	8500/8520 8600 8700/8720 8800	Groups 2, 3 Group 3 Groups 1, 2, 3 Groups 1, 2, 3	$4,695 $6,995 $7,195 $8,995	550

SOURCES OF SUPPLY

FACSIMILE EQUIPMENT

Vendor	Product	Compatibility	Price	Circle
Rapicom (201) 575-6010	3100	Group 3	$3,795	551
	3300	Same	$5,000	
	5000	Same	$6,200	
	6100	Same	$6,259	
	6300	Same	$7,840	
	6350T/6300R	Same	$4,420	
Sanyo (201) 440-9300	SF-935	Groups 2, 3	$4,700	552
	SF-615	Groups 2, 3	$3,795	
Sharp Electronics (201) 265-5600	FO-2530	Groups 2, 3	$3,495	553
	FO-2515	Same	$4,395	
	FO-2531	Same	$4,095	
	FO-2516	Same	$4,995	
Omnifax Telautograph (213) 641-3690	G-21	Group 2	$1,695	554
	G-32	Groups 2, 3	$2,495	
	G-39	Groups 1, 2, 3	$3,500	
	G-96	Groups 2, 3	$5,000	
	G-99	Same	$4,500	
	SF-3	Same	$10,000	
	G-35	Same	$2,895	
3M (612) 733-1110	EMT 9145	Groups 2, 3	$3,700	555
	EMT 9165	Groups 1, 2, 3	$6,500	
	EMT 9140	Groups 2, 3	$2,875	
Xerox (214) 830-4000	295	Group 3	$4,600	556
	400	Same	$1,695	
	495	Same	$6,700	

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A MICRO MODEMS SAMPLING

Vendor	Modem	Requirements	Price	Circle
Advanced Telecomputer Syst. (801) 264-2050	Ultra Link	IBM PC-, PC XT-, or compatible expansion slot	$995	478
	Unattended-communications option		$195	
Anchor Automation (213) 997-6493	Signalman Mark XII	RS-232C port	$399	479
	Volksmodem	Many micros	$83 (includes connector)	
Apple Computer (408) 996-1010	Apple Modem Model 300	RS-232C port	$225	480
	Model 1200	RS-232C port	$495	
Arctic Data (604) 562-5240	Icebox 1	RS-232C port	$1,195	481
Bizcomp (408) 745-1616	PC Intellimodem	IBM PC-compatible expansion slot	$499	482
Cermetek Microelectronics (408) 752-5000	Cermetek 1200	RS-232C port	$595	483
	Info-Mate 212A	RS-232C port	$595	
CTS (203) 743-3681	CTS 212AH	RS-232C port	$445	484
Datec (919) 929-2135	Datec 212	RS-232C port	$595 $695/auto-dial	485
	Datec PAL 212	RS-232C port	$497	
	Datec PAL+	IBM PC and compatibles	$599 (includes Crosstalk software)	
Hayes Microcomputer Products (404) 441-1617	Smartmodem 1200	RS-232C port	$699	486
	Smartmodem 1200B	IBM PC and compatibles	$539	
IDS (401) 333-6200	IDS 6240	RS-232C port	$400	499

SOURCES OF SUPPLY

A MICRO MODEMS SAMPLING

Vendor	Modem	Requirements	Price	Circle
Lexicon (305) 792-4400	Lex-11, 11B, 12, 12B, 15, 15B	RS-232C port	$160 to $400	487
MFJ (601) 323-5869	MFJ-1233	RS-232C port	$130	488
Microcom (617) 762-9310	SX-1200	RS-232C port	$599	489
Multi-Tech Syst. (612) 631-3550	Multimodem Multimodem PC	RS-232C	$549 $549 (includes software)	490
Novation (213) 996-5060	Smart Cat Plus	IBM PC-compatible expansion slot or RS-232C port	$499	491
Penril (301) 921-8600	300/1200 1800 DED 8201 DN 8201 PL	RS-232C port RS-232C port RS-232C port Leased line	$525 $375 $795 $785	492
Racal-Vadic (408) 946-2227	1200V 300V 300 PC 1200 PC	RS-232C port RS-232C port IBM PC IBM PC or compatible	$595 $350 $325 $595 (includes software)	493
Stewart Inst. (213) 532-1237	Teledata PC	RS-232C port	$70	494
Tek-Com (408) 263-7400	202 Series Limited Distance	RS-232C port RS-232C port	$250 to $400 $200 to $500	495
Universal Data Syst. (205) 837-8100	103 JLB 202S 208AB 212 Autodial	RS-232C port RS-232C port RS-232C port RS-232C port	$165 $475 $1,750 $645	496
U.S. Robotics (312) 733-0497	212A Autodial Password Personal Communicator Personal Communicator 64 Personal Communicator 256	RS-232C port RS-232C port IBM PC, PC XT, and compatibles Same micros Same micros	$449 $449 $499 (includes software) $699 (includes software) $999 (includes software)	497
Visionary Electronics (415) 751-8811	Visionary 100	RS-232C port	$595 (includes 2-K memory)	498

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Publication Staff

Promotion Director: Rayna Gillman

Production Manager: Craig Balick

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CIRCLE 27

You can have a local data network running this afternoon!

In fact, you already have most of it installed.

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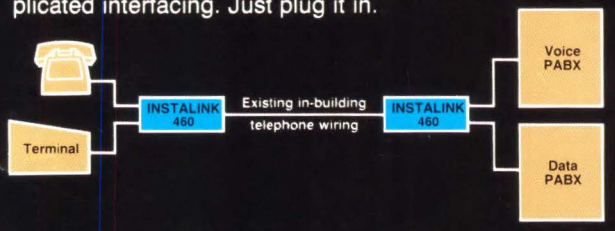

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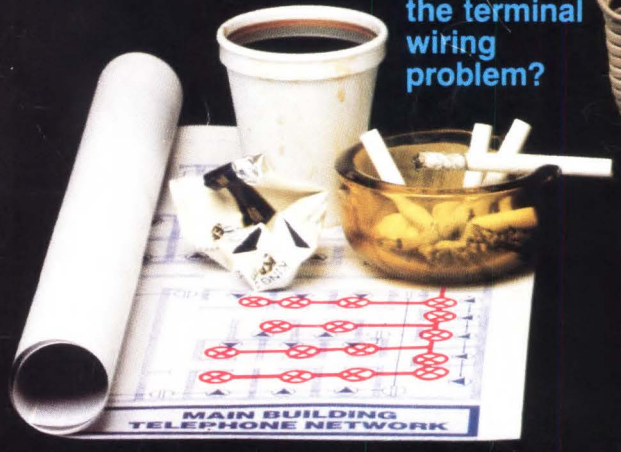

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